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Hygiene in Mexico

A Study of Sanitary and Educational Problems

By

Alberto J. Pani, C. E.

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Translated by

Ernest L. de Gogorza.

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1917

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NOTE

SINCE the sole purpose of the Author of this work was to expose one of the least known, most nefarious and shameful inheritances of the past, in order that it may be uprooted with the most intense energy of which Government, as well as Society in general, is capable, the gross proceeds of the sale of the Spanish edition were placed at the disposal of the People's University of Mexico, in order to further its beneficial labors in favor of our less cultured classes, and especially to promote the teachings of Hygiene:

SALUS POPULI SUPREMA LEX.

FOREWORD

FROM the earliest times, there has been recognized the convenience, or rather the necessity, of having the Powers that Be take action to insure Public Health. We find an eloquent example of this in the theocracy of Moses, whose commandments and laws—which contain most salutary lessons of social hygiene—have explained, from a merely scientific point of view, the astounding immunity of the Hebrew people, during their arduous and protracted pilgrimage through unhealthy regions to the Promised Land.

At present the great endeavors to adapt man to the environment imposed on him by the exigencies of modern life, which he must bear as individual or species, combined with efforts made to discover the chief elements of adaptation—efforts resulting on the one hand from the transformation effected in hygiene by the discoveries of Pasteur, which have directed it along a rational road, and on the other, from the abundant resources supplied by industry—ought to make of the public health one of the most sacred and imperious duties of the State.

Civilization beginning with a social organiza-

tion based upon the recognition of the individual rights of property, especially in what concerns the land, becomes developed and strengthened with the ulterior progress of the same society—that is, through its growing heterogeny. Hence the almost unconquerable difficulty of appraising with precision a condition of advanced civilization. Nevertheless, among its numerous sociological elements, intimately interwoven, we find one conception of basic importance, namely, the necessity of protecting human life, because without this protection the existence and increase of collective bodies become impossible. This, in comparison with that of other social aggregates, can, therefore, be used as a medium for approximate estimation. The State protects the health of the individual in order to make possible the progressive development of society, by popularizing the precepts of private hygiene, and practicing those of public hygiene. For the first it has the schools, as a most excellent medium of propaganda; for the second, with a more direct influence on public welfare, it has recourse chiefly to special establishments (of healing, of disinfection, and of prophylaxis), to works of sanitary engineering, and to laws and regulations for whose strict observance a trained technical personnel especially organized to police and supervise is made responsible. We may state, therefore, without fear of exaggeration, *that there exists a precise and direct proportion between the sum of*

civilization acquired by a country, and the degree of perfection reached in its administration and stewardship of the public health. Consequently I deem it of the deepest importance to reveal the lamentable condition of civilization—as regards public health—in the Federal District, which unquestionably is that portion of the country farthest advanced in material progress. In this way we shall make apparent in the clearest manner possible the sanitary condition in other parts of the Republic, which are densely peopled, and less adapted than the former, from the material point of view, to sanitary improvement. The analysis we intend to make of the necessity for sanitary improvement will fill an inexplicable hiatus in the revolutionary literature of recent years, and will serve to show up, once more, the urgency of improving the precarious economical condition of the popular classes, and will mark one of the principal aspects—the Hygienic—which the future education of labor must have.

We know that, in pursuance with the law of March 26, 1903, the Government of the Federal District was, politically, administratively, and municipally, placed in charge of the Union's Executive, and that the administration has been exercised through three functionaries who are directly subservient to the Secretary of State and Interior: the District Governor, the General Director of Public Works, and the President of the Board of Health. These three officials have held

jurisdiction over all the area occupied by the Federal District, and have fulfilled their duties, either jointly, as Board of Health, or separately, in their respective capacities. It is also known that in all the other Federal States the municipal institution has been likewise emasculated, making it utterly subservient to the Executive, through the oppressive action of the *Jefe político*. Now, although the Decree promulgated on December 25, 1914, by the Revolution's First Chief, answering a national aspiration, has reestablished the autonomy and liberty of the municipality, and although the Revolution has swept away many abuses, still as the inertia of institutions is such that it remains apparent even after their annihilation, it behooves us to ascertain thoroughly the errors committed, and the ensuing damages, in order to obviate the imminent danger of molding in harmful and discarded forms the future organization of the Republic. Hence we consider it of the greatest interest, in the case under consideration, to investigate the causes of the disgraceful state of backwardness in which we find ourselves, as a civilized nation—a condition due to the insignificant protection which our authorities have ever afforded human life.

Briefly, then, these are the aims of this publication. This study has been undertaken by express order of Citizen Venustiano Carranza, First Chief of the Constitutionalist Army, and trustee of the Union's executive power. Unquestionably it is

defaced by the many blemishes resulting from my incompetence and from the pressure of extraneous business thereto, due to my official duties to the State. Such as it is, however, it contains data which I consider valuable, and it is imbued with my most earnest unrelenting endeavor to serve my country in a broader field than that covered by the duties of my post as servant of the Government of the Revolution. I dedicate it, therefore, to those who may find therein some serviceable matter, as a most humble offering to the vast and urgent task of national reconstruction.

A. J. P.

CITY OF MEXICO,
April, 1916.

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I

Public Health in the City of Mexico

I

CHAPTER I

PUBLIC HEALTH IN THE CITY OF MEXICO

IF the Federal District is the part of the country showing the greatest culture and material progress, doubtless Mexico City is that part thereof where preferentially the efforts of our sanitary authorities have been concentrated ever since these have been under the direct control of the Union's Executive. Consequently, such deductions as we obtain from the examination of the sanitary condition of the Republic's capital will acquire even greater force if we apply them to the municipalities outside of the Federal District.

The best way to secure a clear idea of the state of public health in a city is to compare its death rate with that of other cities, always provided that the conditions under the considered viewpoint be comparable. It is well known that the essential condition of comparison, in this case, is the population's density. The dangers to public health are usually in proportion with the degree of density of the social aggregate. However, as the guide given by the average density of population in a city in the course of formation, and there-

fore with a growth apparently abnormal, is very deceptive, varying in Mexico from its maximum value in the closest packed tenements to the scattered inhabitants of the suburbs, and moreover as the city under discussion is the Republic's capital, I shall make the comparison, first with sundry cities having a population about as numerous as that of our own city—in absolute value—and then with the capitals of other nations. If the cities of the first group have not precisely the *same* density of population, we must still consider that nearly all, principally the European, and those of the United States of America, are more densely peopled than even a closely packed district of Mexico City.

I have set forth in the subjoined tables—numbered 1 and 2—the results of my investigations in this respect. The first is a comparative table of mortality in 1911 in thirty-one cities of Europe, America, Asia, and Africa, each of a population ranging from four hundred thousand to seven hundred thousand inhabitants. Mexico's population barely reaches five hundred thousand inhabitants. The second table compares the mortality of thirty-three capitals of Europe, America, and Africa. For greater clearness, I have represented graphically in said tables—by means of proportional areas traced obliquely—the *respective coefficients of mortality*—that is, the numbers of annual deaths per thousand inhabitants, corresponding to the various cities considered. In

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Table No. I I have shown, moreover—by means of horizontal lines shaded with small vertical tracings—*some average coefficients of mortality.*

With the desire to proceed by the surest means in order to ascertain the place occupied by Mexico City in world civilization, according to the health scale adopted, I utilized all available sources of information. Appendix No. II, is a detailed bibliographic specification of all these authorities and sources of information, and of the way of ascertaining and reaching the figures which have served to compile the aforesaid tables.

TABLE NO. I (*See opposite page*)

A cursory view of this table will suffice to show:

I. *That the coefficient of mortality of Mexico City (42.3) is nearly treble of the average mortality coefficient of American cities (16.1) having similar population.*

II. *That it is nearly two and a half times greater than the average coefficient of mortality of the European cities (17.53) which can be compared; and*

III. *That it is even greater than the mortality coefficients of the Asiatic and African cities of Madras and Cairo (39.51 and 40.15, respectively), even though in the former, cholera morbus is endemic.*

TABLE NO. 2 (*See opposite page*)

Although, strictly speaking, the fundamental conditions of comparison—those relating to popu-

lation—are only realized, as before mentioned, by the cities included in Table No. 1, the comparison made in Table No. 2—wherein *we again find Mexico City with the greatest coefficient of mortality, nearly three times greater, for instance, than that of Constantinople (15.09), whose population is double that of our capital, and is constantly threatened by cholera morbus and bubonic plague.* I repeat that the comparison made in said table *demonstrates, more clearly than ever, the sin of inefficiency which stains the administration of our sanitary authorities.*

GENERAL CONCLUSIONS

The obstacles, which we always find in Mexico, in the way of obtaining reliable data to make up the foregoing tables, compelled me to omit some cities comparable with our capital along the double aspect considered. These omissions, however, do not restrict the general character of the conclusions to which the said tables point out. Concentrating therefore, upon table No. 1, which, as before stated, best satisfies the comparison factors exacted, the omissions are:

I. To the South American city of San Paolo, Brazil; the European cities of Barcelona, Spain; Birmingham, England; Kiev, Russia; to the Asiatic cities of Kioto (Japan) and Hyderabad (Dominion of Nizam, British Indies); and to the Australian cities of Sydney, New South Wales, and Melbourne, Victoria. Though I could not state with

numerical precision what are the mortality coefficients of these cities, *I do know that all of them are lower than that of Mexico City*; and

II. To the Chinese cities of Shanghai, Toutcheou, Tchoung-king, and Sou-tcheou, of whose mortality I have no reliable data, nor of their exact population. Though many statisticians assign to said cities populations ranging from five hundred to seven hundred thousand inhabitants, so much uncertainty covers the point, that some geographers and eminent travelers estimate the population of the Chinese Republic from two hundred and fifty to four hundred millions of inhabitants. That is to say, *the probable estimate hardly reaches the rough approximation of nearly forty per cent.*

Therefore, excluding, for aforesaid reasons, the said four Chinese cities, I think I am warranted in formulating the following general conclusion: *Mexico City, capital of the Mexican Republic, in view of the conditions shown in Tables Nos. 1 and 2, is, assuredly, the most unhealthful city of the whole world.*

CHAPTER II

CAUSES OF THE UNHEALTHFULNESS

HAVING measured the degree of unhealthfulness in Mexico City through its coefficient of mortality, it behooves us to ascertain, first, the number and nature of the plagues and diseases affecting the said mortality, that we may deduce, from individual or external conditions originating said illnesses, or favoring their propagation and development, what are the causes of this unhealthful condition. To avoid errors proceeding from circumstances accidental or transient, it is necessary to seek an average of the mortality rate, for each disease, within a given space of time.

The variations of mortality in Mexico City during the last eighteen years—represented geometrically in Table No. 3—do not show, in truth, a marked tendency to descend. The two curves which are observed in the table include each a period of nine years—from 1895 to 1903, and from 1904 to 1912, respectively—producing average partial coefficients (48.06 and 44.27) which only differ from the average total coefficient (46.17)

by less than two deaths for each thousand inhabitants. It is easy to note that the two curves are of similar structure, and that, moreover, the coefficient *minimo minimorum* does not correspond to the last year of the total period considered—wherein there is already manifested a marked tendency to rise—but to the year of 1904, the point of demarkation of the two resulting periods. The space of time which must consequently be adopted to average the figures relative to mortality, is that which corresponds to the last period, that is, the one included between the years 1904 to 1912.^{*} I have extracted for the purpose from the *Annual Reports of Work Effected by the Board of Health*, the data with which I have compiled the tables of Appendix No. III, showing the mortality of Mexico City, and setting forth the various diseases which furnished the causes thereof—grouped in accordance with the generally adopted Bertillon classification—during the period elapsing from 1904 to 1912. In the last column of these tables I have consigned the figures relative to the *Annual average death rate*—that is, the respective averages of the figures corresponding to the nine years aforesaid.

The summary, for these nine years, of the fourteen general groups in which the Bertillon classification divides all the diseases, is graphically represented in Table No. 4, in a manner similar

^{*} See in Appendix No. II the paragraph headed "Board of Health of Mexico City."

10 Causes of the Unhealthfulness

to that adopted in Tables Nos. 1 and 2. *The illnesses producing the greatest mortality, as may be seen in this table, are, successively, those of the digestive apparatus, those of the respiratory organs, and those grouped under the appellation of "general diseases."* To the diseases of the first group correspond nearly a third part (32.14%), and to those of each one of the other two groups, more than a fifth (21.72% and 21.61%, respectively), or, jointly adding the deaths occasioned by the sicknesses of the three mentioned groups, something more than three fourths (75.47%) of the total mortality.

The common character of the illnesses which go to make up each one of these three groups, and especially the particular etiology of the paramount affections, would suffice to cast some light upon the principal causes of the unhealthfulness of Mexico City. Thus for instance: the enormous figure representing deaths caused through affections of the digestive organs, especially diarrhea and enteritis, which cause in excess of four thousand three hundred deaths, might point to bad or deficient food, inclusive of water. The large proportion of deaths due to tuberculosis, from the group of "general diseases," might be taken as a sure sign of the sanitary defects of dwellings. The number of deaths due to affections of the respiratory organs might point to unsatisfactory conditions of paving, inefficient watering or sprinkling, and sweeping of the streets, etc.;

and thus we could go on speculating, with more or less basis in fact, with the other groups of the Bertillon classification.

Nevertheless, in order to better localize and discern the causes of the unhealthfulness under discussion, as I have said before—without regard for the special form of the aforesaid classification—we must ascertain the connection which must exist between the occurrence, propagation, and development of the most deadly diseases and the conditions of life, individual and social, in which the inhabitants of Mexico find themselves.

We may say, speaking generally, that the unhealthfulness of a city depends chiefly on the *urban environment*—that is, on the sum of contaminating influences which the abundant *detriti* of life and of human activity exercise upon the *natural medium*. It is well known that when a certain number of living beings are grouped together and circumscribed in the field of their activities by fixed limits, there are then, necessarily, produced, as a result of social life, *factors of modification of the medium*—contaminating the atmosphere, the soil, and the water, while on the other hand the said medium may previously present, independent of effects resulting from these factors of contamination, certain physical conditions quite unsatisfactory for the normal life of individuals making up the social aggregate.

The principal physical characteristics of the

12 Causes of the Unhealthfulness

medium, with direct or indirect influence upon the health of the inhabitants of a city, are: the *temperature, the meteoric conditions of the atmosphere, wind, rains, humidity, etc.; the nature of the soil, its geological constitution, its permeability or impermeability, and its topographical configuration.*

Having considered the foregoing physical characteristics, we must examine the various elements of contamination of the *natural medium*. We know that the general health in every agglomeration is the result of the state of health of the individuals of which it is composed, and that these work among themselves, upon one another, and upon the medium in very different ways: first, by direct or indirect contagion, physical or moral; second, by taking from the medium what may be necessary for life and making restitution of the part not utilized in the form of detriti. These proceed principally from *food*, which has a decisive influence upon the physiological condition of the individual, and the places where these detriti are accumulated and disseminated in the greatest quantity and consequently where greatest contaminating influence is exercised upon the medium, are, in the first place, *the dwelling*—of as great, or perhaps greater, influence upon health as the food itself—and in the second place, *the highways*.

It would consequently seem logical to examine the various component factors of the urban me-

dium in Mexico, which proceed, as much from the physical conditions as from the social agglomeration, in the order herewith:

Physical Characters of the Medium

- I. Temperature.
- II. Humidity, rains, winds.
- III. Geological and topographical constitution.

Principal Factors of the Urban Medium

- I. The living beings.
- II. The food.
- III. Dwellings.
- IV. Urban circulation.

Having studied the principal causes of unhealthfulness, and measured, up to a certain point, their effects upon the general morbidity and mortality, it will be easy to ascertain adequate means to improve the disgraceful physical and moral condition of the greater part of the metropolitan population. Now, as the mentioned causes are manifested, though not with the same intensity, yet with the same preponderance over all the others, in the remaining cities of the country, the relative conclusions concerning the inhabitants of the capital of the Republic can be generalized, without committing in so doing the slightest infraction against logic, so as to apply

14 Causes of the Unhealthfulness

to the great majority of the urban national population.

In the concluding portion of this study, we shall make, therefore, an *exposé* and condensation of the said conclusions, with the purpose of showing a way which may lead to improving the conditions of life for the individual and for society, referring to the *hoi polloi*, without which we can obtain neither true independence nor prosperity for our fatherland.

II

Physical Characteristics of the Medium

CHAPTER III

TEMPERATURE

THE belief that temperature of itself can be one of the direct causes of unhealthfulness in a city has no basis in fact. Two facts categorically disprove it. The first is, that some tropical cities have contrived to rapidly improve their sanitary conditions by means of principles taught us by hygiene. For instance, Buenos Ayres has reduced its annual mortality, in less than thirty years, from 34 to 16.2 deaths per thousand. Secondly: cities, in certain instances close to one another, and under similar or equal climatic conditions, find themselves in very different sanitary conditions. For example, Chandernager and Yanaon, with respective mortalities of 46.5 and 22.07; Russia, with an average mortality of 33.4, almost double that of Sweden and Norway (16.3), etc.¹

What does have a noteworthy and direct influence on public health, is, on the one hand, heat associated with dampness, and, on the other, abrupt changes in temperature.

¹ E. Macé, Ed. Imbeaux, Albert Bluzet, et Paul Adam. *Hygiène Générale des Villes et des Agglomérations Communales*, p. 36.

Heat—above all, damp heat—is propitious to the action of microbes, which produce fermentation and putrefaction of alimentary produce. This explains the great mortality occasioned by disorders of the digestive organs, infant mortality in hot countries being chiefly caused by diarrhea and enteritis, and the recrudescence of these ills in the temperate zone during the hot season. It is also believed that heat and humidity favor the evolution of pathogenic germs of various infectious diseases. Probably for this reason, tetanus is more grave in tropical countries, whereas grippe and scarlet fever are more often fatal in cool climates, etc.

According to data furnished by the Central Meteorological Observatory, we find that, *during the period included between 1904 and 1912, there were registered in Mexico City, in the months of April and May—which are the hottest—maxima absolute temperatures fluctuating between 28.7 and 33.1 degrees centigrade, in the shade, and between 33.1 and 36.8 outside. The maximum humidity of the air, for the same months, in hundredths of saturation, varied, under cover, between 81 and 98, and, exposed, between 83 and 100.* These figures help us to understand why *in the City of Mexico the distempers of the digestive organs cause more than six thousand four hundred deaths per year.* In this number we have included deaths caused by diarrhea and enteritis which reach 4591, of which 2190 are produced among children who are less than two years old.

As is well known, colds form one of the principal causes of diseases of the respiratory organs. It can be affirmed that *Mexico is the classical city of abrupt changes in temperature, since, in the period of nine years above considered, there have been registered thermic oscillations of daily maxima from 18.2 to 22.2 degrees centigrade, in the shade, and 26.2 to 30.4 out in the open.* The number of deaths per year, on the average, caused by affections of the respiratory organs, is 4329.

It must be noted, however, that the noxious effects of the damp heat, and of the sudden changes of temperature upon the public health, are greatly increased by the deplorable coexistence of other factors, such as: *the physiological poverty of the individuals; the wretched condition of their dwellings; and above all their unsanitary habits and dense ignorance.* This means that, though it may be impossible to work upon the medium so as to improve the natural conditions of temperature, it is nevertheless possible to prevent, or, in any event, to greatly diminish its noxiousness upon the human organism, by acting properly upon the other factors noted. *The frightful figures above given, having reference to the rate of mortality, will serve to set forth the imperious necessity of improving the economic condition of the lower classes and the sanitary condition of their dwellings, and the need of making a vigorous and extensive propaganda of the elemental principles of hygiene.*

CHAPTER IV

HUMIDITY, RAINS, WINDS

FROM the hygrometric point of view, an ideal atmospheric state is taken to be that corresponding to a saturation of 50 to 60 hundredths, and it is accepted that the range within which this hygrometric condition is not materially prejudicial, extends from 25 to 80 hundredths of saturation. Beyond these limits, the air becomes unhealthful, due to extreme dryness or to extreme dampness, respectively, especially in the latter case, if a high temperature should happen to combine with the dampness. Cold itself ceases to be healthful and bracing, if it be unduly humid. *In the City of Mexico, as I have said before, the maximum humidity of the atmosphere, during the hottest months of the year, not only exceeds the highest admitted limit of 80 hundredths, but it reaches the grade of absolute saturation of 100.*

Admittedly, rains of themselves are beneficial for the public health, due to their purifying action upon the atmosphere. However, they have direct influence in maintaining a noxious state of dampness, which arises from the annual precipitation, the

number of rainy days and their distribution during the year, and also as a result of stagnation. *In the City of Mexico rains occur during almost all the months of the year, and the total number of rainy days varied, during the period under consideration, from the minimum of 125 days, in 1909, to the maximum of 178 days, during 1904.*

The conditions in which the city finds itself as regards stagnation or evacuation of the rains, and their connection with public health, will be examined farther on, when we deal with the geological nature and the topographical configuration of the soil.

Winds may be noxious or beneficial. They may serve to renovate the city's impure air, or, on the contrary, owing to their force, they may cause such dust and particles as may be on the ground, on the floors of terraces, or back-yards, etc., to rise up and remain in the air. Or, carrying them from the neighborhood of cities, they may take with them pathogenic germs, specially those of breaking out of eruptive fevers, and those of tuberculosis from the expectorations of consumptives. Moreover, winds increase the probability of taking cold, and consequently predispose people to inflammation of the respiratory organs.

The dominating and prevailing winds in the City of Mexico are, generally, the northern, and the northwestern, and sometimes those of the northeast.

That is to say, they proceed from the valley regions which are most destitute of vegetation. Its maximum velocity fluctuated during the years of 1904 to 1912, between 36.9 kilometers per hour for the year 1908, and 93 kilometers for 1907. The average annual death rate caused by disease in the etiology of which winds may play a part—either carrying pathogenic germs or provoking colds, or driving dust particles which traumatize the breathing apparatus—exceeds seven thousand two hundred deaths.¹

¹ Average death rate in Mexico City occasioned by illnesses in whose etiology winds may play a part, during the cycle from 1904 to 1912.

I. GENERAL DISEASES

<i>Sickness</i>	<i>Deaths</i>
Typhus.....	642.0
Pox.....	345.4
Scarlet fever.....	124.2
Erysipelas.....	112.1
Chicken pox.....	136.8
Diphtheria and croup.....	79.7
Grippe.....	100.8
Whooping cough.....	133.7
Tetanus or lock-jaw.....	1.7
Lung tuberculosis.....	1170.8
Meninges ".....	50.3
Larynx ".....	18.0
General ".....	67.3
Abdominal ".....	220.2
Acute miliary tuberculosis.....	0.9
Of other organs.....	17.6
Acute rheumatism of the joints.....	23.6
	<hr/> 3245.1

II. SICKNESS OF THE NERVOUS SYSTEM AND OF THE SENSORY ORGANS

Tetanus.....	5.9	5.9
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From the preceding figures we discover the expediency, *on the one hand, of bringing about forestal development and agricultural activity along the regions which surround the city, especially in the regions of the north, the northwest, and northeast, and, on the other hand, the imperious necessity of avoiding, or at least of diminishing, the dissemination of particles of dust, by causing them to adhere to the soil as much as possible, as the result of proper paving and copious sprinkling and waterings.*

III. SICKNESS OF THE RESPIRATORY ORGANS

Larynx affections.....	69.4	
Acute bronchitis.....	1115.8	
Bronchial-pneumonia.....	922.3	
Pneumonia.....	1529.9	
Pleurisy.....	78.9	
Congestion, and lung apoplexy.....	215.3	
	<hr/>	3931.6

IV. SICKNESS OF THE DIGESTIVE ORGANS

Angina pectoris and pharynx affections.....	14.6	
	<hr/>	14.6

V. PUERPERAL CONDITION

Puerperal septicæmia.....	82.7	
	<hr/>	82.7
TOTAL.....		<hr/> 7279.9

CHAPTER V

GEOLOGICAL CONSTITUTION AND TOPOGRAPHY

THOUGH, as Bonjean affirms, there may not be such a thing as "strictly telluric epidemics"—which means that the causes of a city's unhealthfulness cannot lie, wholly or partially, in the intrinsic nature of the land whereon it is constructed—nevertheless there is a marked influence exerted upon the health of the inhabitants by conditions of soil which may favor the stagnation of water, or the permanent impregnation of the subjacent layers—that is to say, by the degree of permeability of the soil and its topographical configuration. Besides the influence which waters impregnating the superficial layers exert upon the hygrometric condition of the air, we must remember, on the one hand, the influence also exerted on the process of putrefaction of organic *detriti*, and, consequently, the development of many species of pathogenic germs, and, on the other hand, that from the stagnant waters are bred *mosquitoes*, active agents in spreading disease, such as malaria and yellow fever.

Unquestionably, in such particulars, the City

of Mexico could hardly find itself in a much worse condition. In spite of specific orders contained in the Spanish laws, ordering the formation of a City Council or *Ayuntamiento*—prior to all further steps to build a city or town—in order to select the site for the said town, and with instructions to see to it that it be “*wholesome, convenient, well aired, and supplied with potable water and building material, and with adjacent fields and pastures for cattle*”; notwithstanding likewise that the said City Council was duly appointed and convoked, and that nearly all its component members and the greater part of the *Conquistadores* voted in the negative, Hernán Cortés opposed his over-ruling will to the opinions of the other functionaries of the Crown, and forthwith decided that the future capital of New Spain should be erected upon the ruins of ancient Tenochtitlán. And the new city rose, even as the former, from the waters of the lake, being “*the very worst site which could have been chosen, and most fraught with untoward hazard.*”¹

“The fact that the City of Tenochtitlán had been founded on an islet upon the shores of a lake”—states Don José M. Marroquí²—“was the reason that in the days of the Aztecs there were three different styles of streets: some on *terra firma*,

¹ Letter from the Viceroy Don Luis de Velasco, dated May 20, 1556, addressed to King Philip II., concerning the floods which had afflicted the region during his administration.

² *Mexico City*, vol. i., pp. 24 and 25.

flat, made by hand; others really waterways, that is, canals on whose shores the very doors of the houses would open; and some thoroughfares, partly land ways and partly waterways, as they had longitudinally throughout the center a canal, and along either side long strips of land which permitted the houses to intercommunicate. Hence, the groups of houses, near the center, which were separated by the canals, and formed small islets. Cortés, in order to trace the plans of his new City, seized the center and drew a square bounded as follows: East, by the Street which we call *Santísima* and the following, along the same direction; South that of *San Gerónimo*; West, that of *Santa Isabel*; North, that of *Cocheras*. The space included within this square, which was *the best and most healthful due to the fact that it was least damp*, he devoted to the habitations of the Spaniards, and the irregular outlying strips, *some of which were islets*, he set apart for the homes of the Indians . . ."

The present soil of the City of Mexico is the result of the artificial formations produced by the *detriti* of urban life, and the diversified and multifarious activities, during nearly four hundred years, upon the primitive soil described in the preceding lines—that is to say, filling up gradually the bottom of the original lake. Moreover, as all this was the lowest, or one of the lowest sections of the Valley of Mexico—which is closed—there resulted from all these artificial formations

as the city's foundation, *a thin waterproof layer of nearly horizontal surface*—marvelously favorable for the stagnation of *detriti* liquids and atmospheric precipitations—*resting upon water-soaked lands* and destitute of natural topographic conditions *for its drainage*, since the whole valley is enclosed, or walled in, so to speak.

It would consequently be hard to find a location more disadvantageous than this, from the point of view of sanitation and drainage. Since, however, as regards these, sanitary engineering knows no limits to its skill and powers, we must own that, despite the sums of money and energy displayed, first, to solve the problem of the valley's drainage, and later that of the city itself, all that could and should have been done was not effected, considering the city's crying needs, and the material and technical means of satisfying them. We all well know that some of the city's quarters are still preserved in a truly swampy condition during the greater part of the year.

Although it may not be possible to ascertain with precision what is the coefficient of unhealthfulness corresponding to the natural conditions geologically and topographically considered, it is meet that we should sum up all that precedes in these conclusions:

- I. *The error made by the city's founder in selecting the capital's site, gave the maximum value possible to the coefficient of unhealthfulness aforesaid;*
- II. *The value of this coefficient is always in*

inverse ratio with the degree of efficiency of the required works of urbanization; and lastly,

III. *It is possible, and of urgent expediency, to nullify said coefficient of unhealthfulness, correcting, improving, and completing the works of urbanization upon which it depends.*

III

Principal Factors of the Urban Medium

CHAPTER VI

LIVING BEINGS

THE noxious action of each man upon his fellows, in every society, may operate in two ways: physical or moral. The first is the result, as I have said before, of the modifications brought to the media by the concourse of activities of all the men who, for the gratification of their needs, both individual and collective, make up the social agglomeration. These modes of action, which are of great importance in regard to the general health, will be studied in special chapters. Again, we must consider the noxious condition which proceeds from the transmission of morbid elements, through direct or indirect contact, of a man with his fellows. This mode of action produces what we term moral diseases, in which development and extension take an effective part, combined with the force of example, imitation, suggestion, etc.—in a word, the undoubted and powerful influence of the ambient medium upon education.

Transmission, through contagion, of certain diseases may be the cause of real epidemics. There are diseases which, for their propagation,

do not necessitate that their transmitting agent be the patient himself: diphtheria, for instance, can be transmitted by any one having in his buccal mucosity Loeffler's bacillus, in a virulent state, though the transmitting agent may not present the slightest symptom of the disease. The same may be said of many illnesses; the pathogenic germs which produce them may be conveyed by healthy subjects, or patients, or convalescents. Hence, the frequent opportunities for contagion which may occur in a city, increasing of course in proportion to its density, and the extent of its social activities.

The action of domestic animals upon general health, though of lesser importance, has a similar character. They tend to contaminate the ambient medium, by disseminating decomposing *detriti* in dwellings and upon the highways and all public thoroughfares, besides being singularly effective transmitters of multitudinous contagious diseases.

Among the illnesses in whose etiology living beings intervene directly or indirectly, there are some which, owing to their closely interwoven relations with the present social state, have received the name of *social diseases*. A list of these should be headed by *hunger*. Not considering the most *acute* form, which causes death in a limited space of time, we mean *chronic hunger*, slow insufficient nutrition, which affects so direfully a great portion of the socially lower strata, keeping our common people, as is well known, in a pitiful

condition of *physiological misery*, and serving as one of the most deadly agents of our general morbidity and mortality.

In the second place I will note *infant mortality*. *In the City of Mexico we have to record the awful fact that eight thousand one hundred children less than five years old die annually.* In this frightful toll of human life, *more than forty per cent. of the total*, we must recognize surely, besides the physical causes of contagion, of defective feeding, and unhealthful habitation, this other vital cause of a moral order: *crass ignorance and lack of motherly care.*

Then we must enumerate among the serious menaces for our society: *Tuberculosis and pneumonia*, which produce each more than fifteen hundred deaths per year; *acute bronchitis*, 1115 deaths; *broncho-pneumonia*, 922; *typhus*, 642; *simple meningitis*, 542; *alcoholism*, 390; *black and small pox*, 345; *syphilis*, 148, etc., and lastly, since after all they result generally from social causes, *insanity and criminality*, in whose production and propagation the ambient medium, poverty, and alcoholism play important parts.

The greater number of the diseases under discussion, as previously stated, are *transmissible* through direct or indirect contagion. Through the wonderful discoveries of Pasteur we know much of the mechanical transmission of contagions, and it has been possible to find media—already sanctioned by biological experience—to effica-

ciously combat the pathogenic germs which produce the illnesses, and to give the latter the character of being decidedly *avoidable*. We can do this, even if we include in the mortality occasioned by contagious disease, such illnesses, on the one hand, as *progressive locomotor ataxia* and *general paralysis*—which usually are the consequence of *syphilis*, and, on the other hand, *pericarditis*, *acute endocarditis*, and *organic affections of the heart*, which, though not idiopathic, proceed almost always, from other transmissible affections. We can then state, with assurance that *in the City of Mexico the avoidable diseases*, a term of expression which sounds decidedly ironical here, *kill, each year, more than eleven thousand five hundred persons.*¹

¹ Average death rate, caused through *transmissible* diseases, during the cycle 1904-1912:

I. GENERAL DISEASES

<i>Illnesses</i>	<i>Deaths</i>
Typhus.....	642.0
Typhoid fever.....	32.4
<i>Idem</i> intermittent, and palustic cachexias.....	35.7
Small and black pox.....	345.4
Scarlet fever.....	124.2
Erysipelas.....	112.1
Measles.....	136.8
Diphtheria and croup.....	79.7
Grippe.....	100.8
Whooping cough.....	133.7
Cholera morbus.....	18.3
Purulent infection, and septicæmia.....	55.0
Rabies.....	2.7

In order that measures taken to prevent the spread of contagious disease may give efficient results, it is necessary that they be applied *promptly and efficaciously*. Excluding the portion which,

Dysentery.....	48.7	
Tetanus.....	1.7	
Lung tuberculosis.....	1170.8	
Meninges “.....	50.3	
Larynx “.....	18.0	
General “.....	67.3	
Syphilis.....	148.4	
Abdominal tuberculosis.....	220.2	
Acute miliary tuberculosis.....	.9	
Other organs—tuberculosis.....	17.6	
Cancer of the peritoneum, intestine, rectum...	15.3	
White tumors.....	7.0	
Malignant pustule.....	0.2	
Pott's disease.....	8.0	
Acute articular rheumatism.....	23.6	
Leprosy.....	5.9	
Abscess, and congestive <i>idem</i>	0.5	
Other epidemical diseases.....	2.6	
		<hr/> 3625.6

II. DISEASES OF THE NERVOUS SYSTEM AND SENSORY ORGANS

Simple meningitis.....	542.2	
<i>Idem</i> cerebro-spinal.....	25.9	
Progressive locomotor ataxia.....	8.6	
General paralysis.....	18.2	
Tetanus.....	5.9	
		<hr/> 598.8

III. DISEASES OF THE CIRCULATORY ORGANS

Pericarditis.....	21.7	
Acute endocarditis.....	38.6	
Organic cardiac affections.....	735.6	
Lymphangitis, etc.....	3.7	
		<hr/> 799.6

owing to ignorance or negligence, belongs to the public, we can divide the enormous responsibility for many *avoidable deaths* between two culprits: the physicians who are entrusted with the duty of reporting all cases, and the sanitary authority—the Board of Health—which is entrusted with the duty of efficiently applying remedies and means to prevent the propagation of disease.

As a matter of fact, the Board of Health, in spite of the fact that the Law of Political and Municipal Organization of 1903 did actually concentrate the powers and attributes of this body in the President, has continued, up to the

IV. DISEASES OF THE RESPIRATORY ORGANS

Larynx affections.....	69.4	
Acute bronchitis.....	1115.8	
Broncho-pneumonia.....	922.3	
Pneumonia.....	1529.9	
Pleurisy.....	78.9	
Congestion and pulmonary apoplexy.....	215.3	
		<u>3931.6</u>

V. DISEASES OF THE DIGESTIVE ORGANS

Anginas and larynx affections.....	14.6	
Chronic diarrhea.....	270.7	
" " and enteritis (two years and more).....	2130.3	
Simple peritonitis (except puerperal).....	112.1	
		<u>2527.7</u>

VI. PUERPERAL CONDITION

Puerperal septicæmia.....	82.7	
		<u>82.7</u>
TOTAL.....		<u>11,566.6</u>

present, to act in accordance with the Sanitary Code issued December 30, 1902. It has endeavored by virtue of authority to prevent the propagation of avoidable diseases, and the transmission of contagion and infection, and to repress transgressions against public health, which are specified in the aforesaid Sanitary and Penal Code. The Board governs itself by means of the parliamentary system, in sessions which are held at stated periods, twice a week, in which twelve directors or members and the President take part. This system is particularly adapted to procrastination, and to the weakening of responsibility. The effective individual responsibility is merged into the fictitious responsibility of an abstract entity. The rulings thus taken, in order to be put into execution, are distributed among five sections, according to a classification which—according to Doctor Rafael Norma, ex-secretary of the Board—is utterly illogical. On the other hand, the sanitary inspection, whose coöperation is necessary to any resolution, no matter how sensible or well timed, could hardly be more singularly deficient. The task entrusted to the twenty-two sanitary inspectors of the Federal District is humanly impossible. It is their duty to prevent the formation of sinks of infection in individuals and dwellings, *a task for a physician and an engineer*; to secure the immediate destruction of those already in existence, and to conduct an active propaganda in favor of scientific hygiene, *combining the duties*

of master and apostle. Their sphere of influence and action is a conglomeration of districts containing more than seven hundred and twenty thousand inhabitants, among the largest part of whom are found the direst ignorance and economic and physiological wretchedness. This population is scattered over an area of nearly one thousand five hundred square kilometers.

The following synoptic table—based on the Census of 1910 as regards population, and with data submitted by the same sanitary inspectors, corresponding to 1911, as regards mortality—shows in an irrefutable manner *how impossible said inspection is from the viewpoint of efficiency:*

If we add that the inspectors are not properly backed by authority, and become merely a source of information, we can easily see that, even in the very restricted cases where their efforts might prove serviceable, whatever measures *their observation and experience may have caused them to suggest become, as it were, stillborn*, subject to unpractical red-tape and woful procrastination.

Nothing can be more forcible than the mere enunciation of the horrible fact, that *eleven thousand five hundred preventable deaths occur each year*. This must serve to drive home *the urgent need of instantly improving the regulation and organization of the corresponding services*, and of ensuring primarily the immediate reporting of all dangerous cases, and then *the prompt application of necessary measures, such as marking*



infected dwellings by means of posters or placards (*l'affichage*) so that the public may have the precaution not to enter therein, *making careful research to ascertain the causes of the contagion, conveniently isolating the patient, disinfecting everything which he may have contaminated, and supplying and imposing*, according to the cases, such means of prevention as *vaccination* for pox¹ and *immunization* for diphtheria, rabies, tetanus, dysentery, cerebro-spinal meningitis, etc.

To ensure more thoroughly the efficacy of the preceding sanitary measures, we again emphasize the necessity of these two things: *the economic improvement of the masses of the people, and their hygienic education.*

¹ No preventive is so simple in its application, and sure in its results, as *antivariolous vaccine*; hence the fact that civilized countries have been able to completely destroy the morbidity of small and black pox. Therefore the 345 deaths caused yearly by these infections in Mexico City are a most shameful stigma on the good name of our sanitary authorities.

CHAPTER VII

NUTRITION

TO maintain the physiological equilibrium of the living organism—that is, to repair the losses of the tissue constituents, and to supply the necessary energy for their functional activity, are the requirements of *nutrition*. Hence every community needs, in order to be fit, an adequate provision of *pure potable water and proper food*.

I shall endeavor to study, in the course of this chapter, the nutritive value of water as well as of food, properly so called, so as to ascertain the conditions under which the inhabitants of Mexico City are placed in these respects.

Water

Water enters into the constituency of the tissues in such quantity, that it makes of them a truly aqueous mass in whose bosom is enacted the biological phenomena of living organisms. The human body contains, on the average, 650 grams per kilogram of living weight; in an individual of 65 kilograms of weight, the water making up his

tissues would weigh, consequently, something more than 42 kilos.

Variations in the proportion of water in the organism produce pathological dislocations or disturbances proportional to the gravity of the said variations. The diminution of water in the blood occasions a diminution twice as great of the water in the muscles, and these pathological consequences are exteriorized, when this diminution is very small, by means of simple pains. But let the decrease reach only three per cent. of the normal proportion of water, and behold the kidneys can no longer eliminate the insoluble cellular *detriti*, and death results through auto-intoxication.¹

When on the contrary there is an excess of water in the organism, the elimination through the kidneys and skin carries organic and mineral compounds, and produces an exaggeration of dissimilation.²

A man at rest eliminates daily through the kidneys, intestines, lungs, something more than twenty-four cubic centimeters of water for each kilogram of living weight. Energetic work, upon increasing pulmonary evaporation and provoking with activity the cutaneous evaporation, causes a considerable rise in the daily elimination of water by the human organism. Now, as a part of the water eliminated proceeds—according to Voit—from the oxidation of the hydrogen of the hydro-

¹ J. Ogier et Ed. Bonjeau, *Le Sol et l'Eau*, pp. 202 and 204.

carbon compounds, and of the chemical reactions, the minimum quantities required per day, for a man weighing sixty-five kilograms, were he at rest or at work, would be, respectively, one liter and three quarters, and two liters and a half.¹

We can therefore state, in view of the preceding, that the real function of water, or at least its most important duty from the point of view of nutrition, consists in supplying the said losses of liquid, inherent to the functional activity of the organism. "Now," says Pouchet,² "the proportion of mineral salts and dissolved gases hardly preoccupies the hygienist any more. . . . Long distance navigation, and the impossibility of conserving water sweet for long spaces of time in tropical climates (aiding nutrition with distilled water), greatly modified the old ways of appraising the qualities of the water. . . . *The organoleptical qualities, to which formerly such important attributes were ascribed, nowadays offer but mediocre interest, and can assuredly be presented as secondary qualities.*"

What is unquestioned is the powerful influence—the effects of which are manifested under the form of endemics, epidemics, or increase in mortality—exerted by the water consumed, upon the general health of the community, whenever it happens to be *contaminated*. To satisfy the numerous individual and collective requirements

¹ J. Ogier et Ed. Bonjeau, *Le Sol et l'Eau*, pp. 202 and 203.

² *Annales d'hygiène et de médecine légale*, vol. xxv., April, 1891.

of a community, water acts on the public health, both directly and indirectly: as food, as cleansing agent of the human body, of linen and clothes, of dwellings, of the city; and in a thousand different ways, corresponding to the different ways of utilizing water for economic and industrial uses.

Limiting my remarks, for the present, to the application or use of water as food, we can say that water acts directly upon the health of individuals through its temperature, and especially through its degree of impurity. Hence the reason that all modern hygienists are completely agreed in considering *the freshness*, and above all the *chemical, biological, and bacteriological purity*—understanding as such the absence of all noxious substance, and of all living organism, plant or animal, of deleterious effect—as *being the sole essential characteristic conditions of drinking water*.

After mentioning the hygienic drawbacks of overcharged waters, which, surcharged with in-offensive or toxic mineral substances, with organic matter, as well as with the products of decomposition of such substances, bring on diarrhea and predispose to infection—a wonderful preparation for the generation of pathogenic germs;—after noting, that many parasites conveyed by water can seriously affect animal organism, and that *dysentery, cholera, and typhoid fever* are the three hydric illnesses *par excellence*—*I must reiterate*

what is but too well known, *that the water consumed by the inhabitants of the metropolis has, until very recently, presented, owing to its defective conduits and distribution, all the characters of chemical, biological, and bacteriological impurity, rendering it one of the determining causes of the mortality and, above all, of the extreme morbidity of Mexico City.*

It is fair to assert that the conditions affecting the drinking water have been lately improved to a remarkable degree. The water coming from the springs of the southerly part of the valley—Noria, Quetzalapa, Nativitas, etc.—taken up at its point of issue, carried in an enclosed aqueduct, and distributed by means of a most modern pipe system, reaches the houses, and we may say the very lips of the consumers, in a remarkable condition of freshness. Such are its conditions of purity, that *from December, 1912, and during the whole of 1913 there were carried on monthly examinations of the water, taking samples analyzed from scattered houses throughout the city, and the results ascertained proved that the average number of aerobic bacteria per cubic centimeter barely reached eight—with extreme fluctuations from three to seventeen—these figures corresponding, according to Miguel's classification, to the category of "exceedingly pure water."*¹

¹ Drs. Francisco Paz and O. González Fabela. *Bacteriological Analysis of Xochimilco Waters*, practiced at the laboratory of the Board of Health of Mexico, January, 1914.

But as the general sanitary condition of a city is the result of the complete and simultaneous satisfaction of all fundamental hygienic needs of individuals and of the community, it may be stated—without the faintest intention of exaggerating—that *the isolated satisfaction of only one of the sad requirements, in view of the frightful infractions of elemental hygiene depicted in the pages of this treatise, has about the same effect as that of a weak ray of light projected into a pitch dark abyss.*

Foods, Properly So-Called

In order to realize the physiological object of feeding, it is necessary that the constituent substances of the daily normal ration measure up to a certain condition of quality and quantity. These substances—taken by man from the three kingdoms of nature—are of complex make-up, but they may be decomposed into simple organic principles, among which albuminoids, fats, and carbohydrates are of preponderant and decisive importance. We must therefore have a mixed regimen made up of these nutritive elements, whose adequate proportion—from the double physiological and economic point of view—has been approximately calculated, by means of “experiments in feeding with rations artificially compounded so as to realize the equilibrium of nutrition (Pettenkofer and Voit, Ranke, Beneke,

etc.), and by tabulating the general averages of rations freely selected for communities in good health, strength, and physical and cerebral activity" (Forster, Hock, Voit, Atwater, A. Gautier, Lapique).¹

As regards the normal daily proportion of albumina for an adult, while Voit and Pettenkofer fix it at 1.69 grms. for each kilogram of living weight—the figure accepted by nearly all physiologists—Lapique estimates it at only one gram. These values would correspond, for an individual of sixty-five kilos in weight, to 110 and 65 grams respectively. On the other hand, Gautier has found that in Paris an adult of average weight, in good health and at rest, consumes, approximately, 107 grams of albumina per day.

Noting that "populations or social categories which have the weakest ration of nitrogen are usually the most wretched and least resisting, whereas, on the other hand, strong, prosperous communities use in their regimen a quantity of albumina ever larger than the share considered normal by physiologists," and considering the fact that a small excess over the normal theoretical proportion, without provoking the drawbacks of an excessive nitrogen nutrition, strengthens the resistance of the organism in case of certain infections, notably that of tuberculosis, Rouget and Dopter give the preference to the high figures of Voit and Pettenkofer, of Forster and Gautier,

¹ J. Rouget et Ch. Dopter, *Hygiène Alimentaire*, p. 126.

and conclude that *the quantity of albumina required per day for an adult at rest must oscillate between 107 and 118 grams, which gives an average value of 112 to 113 grams.*¹

Fats and carbohydrates, upon oxygenating into the tissues as in a calorimeter, generate heat, and produce, as an ultimate result, water vapor and carbonic acid. The required proportions of these substances, in order to complete, with the prescribed quantity of albumina, a normal nutritive ration, may be ascertained, as Rouget and Dopter have ascertained it, by taking into consideration the essentially dynamogenic character of the aforesaid substances.

In truth, in accordance with Rübner, the energy supplied by the three fundamental feeding principles can be expressed in *calories*, in the following manner:

1	gram of albumina generates.	4.1	calories
1	" of carbohydrate (starch). . .	4.1	"
1	" fat.	9.3	"

Now, as the number of calories usually required for the conservation of life varies between 2500 to 3000 for an adult at rest, or, an average value of 2750 calories per day, and as the albuminoid substances supply

$$112 \times 4.1 = 559.2 \text{ calories,}$$

¹ Work previously quoted, p. 128.

the difference

$$2750 - 559.2 = 2290.8 \text{ calories,}$$

must be supplied by the ternary foods. Supposing that the only source to fill this deficit of energy be supplied by the hydrocarbonate foods, the required sum of these should be:

$$\frac{2290.8}{4.1} = 558.73 \text{ grams.}$$

Of fatty substances there would be required to supply the same sum of force:

$$\frac{2290.8}{9.3} = 235.57 \text{ grams.}$$

Physiologically, it is indispensable to associate albumina, fats, and carbohydrates. The best economical combination of these feeding principles is that resulting from utilizing them in the following respective proportions:

$$1 : 0.5 : 4.$$

Following the numerical data above referred to, the formula for normal daily ration, for an adult of medium weight, in good health and repose, would be¹:

¹ J. Rouget et Ch. Dopter, *Hygiène Alimentaire*, pp. 129 and 130.

	<i>Grams</i>	<i>Calories</i>
Albuminoids.....	112	459.2
Fat.....	56	520.8
Carbohydrates.....	448	1836.8
		<hr/> 2816.8

Naturally, this result cannot be said to have an absolute character. It is possible to preserve the equilibrium of the organism by combining the three principles of nutrition in the proper proportion, provided the formula be modified in keeping with the isodynamic or isoglycosic equivalents of the foods, whether we adopt respectively the theory of Rübner, or that of Chauveau.

Muscular work, necessarily, provokes a greater consumption of fuel, and consequently the conservation of organic equilibrium demands a stronger and richer feeding ration. According to Hervé-Mangon, this must be capable of producing the following sums of energy:

For moderate work.....	4200	calories
" ordinary "	4800	" "
" heavy "	6000	" "

The preceding theoretical considerations having fixed the daily normal nutritive ration for an adult of average weight, in repose as well as in various states of muscular activity, it is necessary to apply these considerations to certain special cases, in order to ascertain the true condition of the popular classes, from the point of view of

nutrition, in the City of Mexico. With this object in view I have made numerous observations of individuals and families belonging to various social scales. However, I think that for the purposes of this chapter, it will suffice to study a single family whose social and economic condition approaches, or excels, that of the majority of families in the town. In these conditions are to be found the four examples which form Appendix No. IV, the first of which will serve to make the hygienic analysis of the popular nutritive regimen.

The said example refers to a laborer, named Agustín López, a man of temperate habits, who has a small family, composed of himself, his mother, and his wife. The smallness of his family gives it a noteworthy economic advantage over the generality of families of the same social standing. He works continually, excepting neither Sundays nor holidays, in gardening and leveling the city's parks, for which he receives \$0.75 per day. With the data furnished by the family itself in the month of October, 1914—which data were duly checked and proven by me—I was able to draw up his weekly budget, *corresponding to the time when these data were compiled*, and it reads as follows:

Expenditure

Nutrition:

8 "cuartillos" ¹ of corn.....	\$1.04
2 " of beans.....	.48

¹ N. of the T. Mexican measure equivalent to about 2 liters.

2 kilos of meat.....	\$.70	
Peppers.....	.16	
Salt.....	.11	
Sugar.....	.11	
Coal and wood.....	.60	
"Pulque".....	.42	
	<hr/>	\$3.62

Clothes:

2 meters of "manta" ² or percale.....	.62	
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Washing clothes:

Soap.....	.25	
	<hr/>	.87

Rent:

He pays weekly for a narrow and damp room in the 5th Street of Chile No. 19 Colonia Santa Julia.....	.50	
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Hair cutting:

He has his hair cut every three weeks at a cost of \$0.20, making the weekly allotment	.07	
	<hr/>	.07
TOTAL.....		\$5.06

Income

He earns weekly, at the rate of \$0.75 daily.....	5.25	
Weekly balance in his favor.....		\$0.19

The perfect balance of this budget—*yielding a balance in his favor of barely nineteen cents per week*—is appalling in its significance. Any untoward happening, which would prevent the head of the family from working for a single day, or which

² Coarse cotton cloth.

might give rise to an increase in household expenditure, or an increase in the prices of articles of first necessity—at present such are four times higher than those stipulated;—in short, any disturbing cause, however small, which might unbalance so close an estimate, would cause untold suffering to the small family.

Let us now see, whether the salary or wage, of the day laborer in question can, under normal physiological conditions, suffice to keep together body and soul for the worker and for those dependent on him.

I owe to my worthy friend, Don José Terrés, M.D., Director of the National Medical Institute, the following analysis of the three essential substances which make up the food of the masses:

	<i>Albumina</i> %	<i>Fat</i> %	<i>Carbo- hydrates</i> %
Indian corn or maize.	8.6	4.0	73
Frijoles or beans.	21.0	1.5	62
Meat.	19.0	13.0	—

Applying these data, and that given in the preceding pages, it is possible to subject to analysis the nutritive substances consumed per week by the family under discussion, and also to determine the relative quantities of energy produced, thus:

	<i>Grams</i>	NUMBER OF CALORIES	
		<i>Partial</i>	<i>Total</i>
11.2 kilos Indian corn produce:			
Albumina.....	963.2	3949.12	
Fat.....	448.0	4166.40	
Carbohydrates.....	8176.0	33521.60	41,637.12
3.8 kilos beans produce:			
Albumina.....	798.0	3271.80	
Fat.....	57.0	530.10	
Carbohydrates.....	2356.0	9659.60	13,461.50
2 kilos meat produce:			
Albumina.....	380.0	1558.00	
Fat.....	260.0	2418.00	39,76.00
Sum total of weekly energy.			59,074.62

The omission which I made in the previous analysis of the almost homeopathic doses of peppers, sugar, and "pulque" consumed by the family, is more than compensated by not having taken into account the great loss of food value which corn suffers upon being transformed into dough or mass, for the making of tortillas or corn fritters, as many of the food constituents of this cereal are invariably lost and dissolved in the heating water.

The sum of 59,074.62 calories, which results from the analysis given, is the product, as previously stated, of the feeding of three persons

during seven days. The energy supplied per person and per day is consequently:

$$\frac{59,074.62}{3 \times 7} = 2813.07 \text{ calories,}$$

a figure which barely equals that representing the energy consumed by an individual at absolute rest. Now, as the three persons of the example considered do work more or less of a rough nature, the man laboring as a peon in the public gardens and parks, and the women in such occupations as grinding maize, rolling "tortillas," sweeping, washing, ironing, etc., the ration of nutrition is most deficient. It is so even if we accept the hypothesis that the work carried on by these people is of the kind that Hervé Mangon styles "ordinary"—which consumes 4800 calories—and *it would be necessary to increase the said ration at least seventy per cent., in order even to return to the organism the wastage caused by the muscular effort expended.*

In other terms: the item of the weekly budget relative to the feeding of the family (\$3.62) would have to be increased seventy per cent. or by \$2.53, or \$0.36 daily, almost fifty per cent. of the daily wage. It would have to be raised from \$0.75 to \$1.11, in order merely to conserve the life of the laborer and that of the other two persons who are under his immediate economic care.

This deficit in the laborer's budget—a repre-

sentative example of what occurs among the lower classes of the nation—which leaves without repair a goodly portion of the energies spent in daily labor, must fatally lead, through a prolonged and painful agony, to the complete annihilation of our race. In the face of evils of so grave a nature and of calamities so imminent and direful, the indifference, or abstention of the state—the only power capable of remedying them—would appear a criminal monstrosity. *Therefore it becomes imperative to prevent*—by means of unavoidable legal regulations—*the salary from falling lower than the limit imposed by the complete satisfaction of the material necessities of life.*

But modern legislation goes farther still. Besides including as compulsory the precept of “minimum salary,” it fixes the amount in such a manner that it permits not only the satisfaction of the bare necessities of life of an average family, but also such requirements as may result from the position of the members of this family as human beings living in a civilized community. Compared with this dignified and dignifying status, humane and just—which no one could gainsay nor challenge—the daily wage of the great majority of our workmen is becoming more miserable and paltry. In the special case under consideration, let us suppose that the insignificant increase of \$0.89 daily would suffice to supply all other necessities of a decorous life—improvement of dwelling, clothing, etc., for a family made up

of three persons. *Then a minimum salary of \$2.00 daily would be required—in other words, nearly three times that received by the laborer whose condition we have been studying.*

Before closing, I shall call to mind that since October, 1914—the time at which the foregoing data were taken—the economical conditions of the country have grown worse so rapidly, as a consequence of the internecine strife, that on the one hand the cost of articles of first necessity has increased fourfold, and on the other, many sources of employment have ceased to exist. Moreover, as a natural sequence of the present phase of the Revolution, we are yet far from the magnificent: “ . . . he despoiled the mighty and uplifted the humble; to those in need he vouchsafed plenty, and the rich he stripped of all they had amassed. . . .” Excluding the restricted military class, which monopolizes all the privileges of the bureaucratic—much more reduced than the former and which lives within the official budget—and of the contemptible group of merchants and traders destitute of all scruples and morality, who prey pitilessly on human wants and misery, it can be said that in the great mass of the national population, wealth has turned to poverty, and there exists the peril of there arising, from the depths of former wretchedness, a new disgrace for civilization. There may appear *a new heading, in the already horrible table of our national mortality, covering deaths through starvation.*

This chapter was written in Vera Cruz, in the beginning of July, 1915, while the City of Mexico was occupied by the Zapatista forces. During the period of siege and final occupation by the forces of the Constitution—July and August—the privations undergone by the inhabitants of the metropolis were such that the fateful prophecy of *deaths through starvation* became a horrible fact. Subsequently, the prices of many articles of first necessity not only increased fourfold, as stated, but rose tenfold as a consequence of the depreciation in value of the circulating medium. Unquestionably, the physiological misery occasioned among the masses by such precarious conditions of existence has been the pregnant field for the development, with intense energy, of the recent epidemic of typhus.

CHAPTER VIII

DWELLINGS

THE great influence of the dwelling upon individual and collective physical well-being is self-evident. The unhealthful habitation acts directly upon the individual, transmitting contagion, or submitting him to the action of some given cause, general or permanent, which may favor the breaking out of some disease, such as rheumatism, which may be caused through dampness. Or it may act indirectly upon the human system, producing anemia, which predisposes to tuberculosis and other affections which would not attack a stronger organism. Calling to mind, on the other hand, the relation of living beings, from the point of view of morbidity, with urban conditions, it is easy to conceive that just one infected house may be the origin of a devastating epidemic. Hence the fact, that *putting houses in a healthful condition, by general overhauling or other means, becomes the most important part of urban hygiene.*

Every house in order to be conducive to health must fulfill certain conditions of *cleanliness*,

drainage, supply and quality of water, humidity, ventilation, thermality, light, architectural distribution, structure, and dimensions.

I shall review these necessary conditions, with the purpose of summarizing, so far as possible, their relations to the state of health in the City of Mexico.

CLEANLINESS, DRAINS OF DETRITI, AND DRINKING WATER SUPPLY

Filth is a heinous sin, whether individual, house, or town be considered. Cleanliness, by preventing the permanent presence of all kinds of residue and *detriti* in the house or street, eliminates one of the most important causes of contagion, and prevents, on the one hand, the generation of putrid and unwholesome odors, which result from the decomposition of said *detriti*, and which exert a positive harmful action upon human organism, weakening it and predisposing it to all infections. On the other hand, it prevents the breeding of parasites such as bedbugs, lice, fleas, etc., the last of which, according to investigations made in our hospitals by Ricketts and Goldberger, seem to play an important part in the propagation of typhus. We may say in a few words, that *all hygienists are agreed in considering scrupulous and intelligent cleanliness as the first preventive against contagious disease.*

It will suffice to observe the filthy condition

of our apartment houses and tenements, in order to state *that lack of cleanliness is one of the principal causes of the 642 yearly deaths through typhus, and a general cause of all the contagious diseases, which result in 11,500 deaths annually.*

Absolute cleanliness of the house depends not only upon the clean and orderly habits of the tenants, but also upon certain building and sanitary provisions which facilitate or render possible such a condition of cleanliness. Therefore as regards the house itself we must, on the one hand, eschew in its construction such materials and shapes as cannot be easily cleaned, preferably washed, and, on the other hand, we must supply it with means for causing the rapid evacuation of all detritus and defecation.

To secure the former, it can be specified, for instance, among many other stipulations, that the distribution and size of apertures be adequate to provide satisfactory lighting; that connections of walls, with each other and with roofs shall be replaced by curved surfaces, thus doing away with ensconcements and anfractuositities; that walls be built so as to avoid dampness; that walls, floors, and roofs be perfectly smooth, to prevent the accumulation of dust, and to facilitate washing; that the floors be resisting, waterproof, not subject to rot; that they shall not be cold, hard, creaking, etc.

Hygiene does not stop here, but likewise prescribes, as an indispensable complement of sani-

tary habitation, the conditions governing the class of furniture to be used, the best systems of cleansing and scrubbing, etc. Among the latter, for example, it recommends for removing dust from carpets and porous furniture, vacuum cleansing methods, which have become so popular in American and European cities, and which methods are utterly unknown in Mexico, even among the families of wealth.

If we acknowledge the unquestionable fact that only the palaces of some magnates in Mexico could satisfy the hygienic prescriptions already mentioned, and that the immense majority, or totality, of the houses inhabited by our middle and lower classes are but a heap of infractions of the said precepts; if we recall the asphyxiating cloud of dust always raised upon sweeping either the streets or the floors of all homes, rich and poor, we must confess that the usual methods of sweeping and cleaning run counter to the mandates of hygiene, and we shall have proven our contention that *the lack of intelligent and scrupulous cleanliness in Mexico is one of the determining causes, as aforesaid, of the heavy mortality caused by contagious disease.*

Health demands, as is well known, that all *detriti* and sweepings, once picked up, be promptly removed from home and city before they have the opportunity of giving forth putrid emanations, or of disseminating pathogenic germs which might

contaminate the air, the soil, or the water. The *detriti* under consideration comprise:

1. *Human Excrements*. The following table—due to Heiden—makes known the average weight of fecal matter and of urine per day per inhabitant, and the quantities of some substances which act as constituents:

CHEMICAL COMPOSITION	Fecal matter (grams)	Urine (grams)	Total (grams)
Natural state.	133.0	1200.0	1333.0
Solid substances (dry).....	30.3	63.0	93.3
Organic matter.....	25.8	50.0	75.8
Nitrogen.....	2.1	12.1	14.2
Mineral substances.....	4.5	13.0	17.5
Phosphoric acid.....	1.64	1.8	3.44
Potassium.....	0.73	2.22	2.95

Lehmann, Wolff, and Pettenkofer give figures very similar to the foregoing.

Therefore, the daily production of human excrements in Mexico City is about 62.65 tons of fecal matter, and 565.28 of urine, or a total of 627.93 tons of fetid and putrescent matter.

Fecal matter, according to Gilbert and Dominici, upon issuing from the intestine, contains from 67,000 to 80,000 germs per milligram, including in these figures intestinal parasites and their eggs. *Consequently, every inhabitant expels daily from 8911 to 10,640 millions of germs and parasites,*

ready to increase ad infinitum in the semi-liquid defecations. Urine suffers a rapid ammoniac fermentation, and can also contain pathogenic germs, especially the typhus bacillus, and that of tuberculosis. This shows the danger of the inveterate use of the chamber pot in dwellings, even among the higher classes. Probably this use was caused by defective architectural distribution. Also it is necessary to combat the pernicious habit of the lower classes to urinate in any street corner, by means of rigorous punishments, and by the establishment of all the urinals and public water-closets which the population may require.

We thus see the great need of rapidly removing from houses and city all *detriti* and defecations. It is true that our capital possesses, for the purpose of removing excremental matter, residue and cleansing waters, and rain precipitations, a network of draining vaults and pipes connected with the sanitary installations of the homes, and that this installation is devised and constructed according to approved modern methods; but unfortunately this network does not extend over the entire city, nor do the sanitary installations work smoothly. There still remain to be built *about sixty kilometers of piping, and more than five and a half kilometers of collectors*, in some suburbs and neighboring colonies, where the evacuation is still carried on by means of the *most defective ancient canalization*, or by *the primitive and dangerous system of collec-*

*tion through casks, which method has been utterly discarded and condemned by hygiene. As regards private installations, suffice it to say that last year there were about fourteen thousand houses with pending cases before the Board of Health, for infractions of extant sanitary precepts, and that among such houses there were cases such as that of the home "which had been visited seventy-one times by the inspection officials, without having secured any material improvement in conditions of sanitation."*¹

The cursory report of the conditions governing evacuation of *detriti* and defecations given in the foregoing lines, warrants the assertion that *among the principal causes of disease in Mexico City must be reckoned the bad habits of the population, deficiency in works of sanitation, and the inefficiency of official sanitary inspection.*

2. *Animal Excrements.* These generate dangers similar to those which we have enumerated, with one addition. Dung, when not kept in closed receptacles, presents a favorable condition for the breeding of flies, and these flies on account of their relation with the equine species aid in the propagation of tetanus. These insects carry the small fecal particles adhering to their legs, and deposit them everywhere, on the furniture, on our food, on ourselves, and thus constitute a serious cause of infection.

¹ Dr. Rafael Norma, ex-Secretary of the Board of Health of Mexico.

If the other requirements of the public health are so deficiently provided for in Mexico, although the sanitary authorities possess facilities for that purpose, what shall be said of the *constant* collection of dung in closed boxes, and of its *rapid* removal from the vicinity of houses, when these operations have always been left to the exclusive concern of the parties interested?^{*}

3. *Refuse and Residue Waters.* Under this heading are included: (a) those from the kitchen, which served to wash vegetables, meats, china, and which convey fermentable residue of foods, greases, etc.; (b) waters used for personal cleanliness and which contain epidermical particles with pathogenic germs; (c) washing waters, similar to the preceding, but which may wash beside some fecal particles; (d) lastly, those used to cleanse floors of dwellings, frequently pervaded with noxious dust.

The volume of these waters generally depends upon the habits of cleanliness among the population, and upon the quantity of water at the city's

^{*} In 1911, I visited the National Veterinary and Agricultural School, to investigate its sanitary condition, and found among many infractions of hygiene, the following: one of the dormitories lay above the stable for diseased horses, in such way as to be separated only by means of a floor formed with boards, in a vile state of preservation, nailed over wooden beams. The emanations produced by the decomposition of dung and liquid dejecta of diseased animals, upon a stone and undrained floor, could pass freely through the gaping interstices between the boards of the floor, to invade a dormitory where twenty-seven beds were prepared for the students.

disposal. They are always highly fermentable, and as such decidedly noxious. To corroborate the conclusions concerning the defective manner in which the evacuation of excremental matter in our capital is carried on—since the waste waters must be evacuated through the same canalization—I shall mention two causes of public disease, resulting from the frequency with which dwellers throw into the yards of many tenements the whole or most of the waste waters, and from the custom of washing clothes, even those of the sick, without previous disinfection, in the *common wash sinks* of these yards.

4. *Sweepings.* The principal constituents of sweepings are: (a) vegetable and animal residue, highly putrescent, proceeding from the kitchen; (b) ashes, other residues of furnaces, stoves, pieces of china, etc.; (c) sweepings from dwellings, which may contain, especially if inhabited by some patient suffering from some infection, pathogenic germs; (d) combustible substances such as paper, corks, pieces of wood, etc.; (e) lastly, metallic objects, such as tin cans, nails, etc. The proportions in which such elements find themselves mixed vary in different cities; they vary even in the same city, according to the time of the year. However, what does characterize the assortment, at all times and places, is its extreme putrescence.

Lacking precise data regarding the special composition of sweepings and filth of Mexico City, I shall mention as an example, in order to

give an idea of the general character of the said *detriti*, the result of the analysis made by Ladureau and Violette, of the sweepings of Lille City:

CHEMICAL COMPOSITION	<i>Recent Sweepings</i>	<i>Old Sweepings</i>
	%	%
Water proportion.....	30.50	34.25
Organic nitrogen matter, and ammoniac salts.....	2.07	1.82
Non-nitrogenic organic matter.....	16.43	16.93
Lime phosphate.....	0.88	1.06
Potassium and soda (soluble) salts..	0.67	0.64
Carbonate and sulphate of lime....	1.24	5.35
Iron oxide, silica, and silicates soluble.....	46.57	39.03
Magnesia.....	1.64	0.92
TOTALS.....	100.00	100.00
Value in francs of the ton as fertilizer.	7.1	6.25

The production of sweepings in a city varies generally from 0.5 kilos to one kilo per head per day. *Taking the average of 0.75 kilos for Mexico City, this would produce daily 353.3 tons, or, since the average density of these detriti is estimated at 0.600 approximately, 588.8 cubic meters of sweepings, which are, the same as excremental matter, putrescent and ill-smelling.*

Precisely because of this character of putrescence, all agree in demanding that the operation of withdrawing filth and sweepings from houses

and streets be effected daily; that it be carried out during the night or during the first hours of the morning, and in a manner to safeguard it from the effects of sun and wind, so that organic matter contained in these sweepings shall not be decomposed and scattered. That is to say, that the collection and transportation be effected in hermetically sealed metal receptacles. This will not suffice. Once the sweepings have been collected and carried away from the city, it is necessary to destroy them, in order not to constitute, by their simple deposit, a new danger. This may be done by *means of their industrial utilization, or by their incineration.*

Since Mexico City is far from fulfilling such requisites, with its primitive "*Rabones and Guayines Cars,*" permeable and uncovered, which circulate along streets and highways at all hours of the day, collecting, in old wooden packing cases, sweepings deposited at street corners, or near yards or hallways of houses, which later are to be thrown in the waste fields of Peñon and Niño Perdido, in the suburbs of the city itself, *we must recognize in the notorious deficiency of this service another cause of contamination of the urban ambient, eminently suited to the propagation of contagious disease.*

5. *Corpses.* Man and animals extend their noxious influence over the ambient, even after death. However great may be the respect that we may feel for our dead, we are bound to consider

them, from a hygienic viewpoint, as *detriti*, whose permanence in the dwelling engenders great danger to the health of the living, especially if the death has been caused by contagious disease. Hence the expediency of removing them from home and city just as quickly as possible.

The corpses of small animals, such as dogs and cats, etc., are usually thrown out on the highway, whence they are taken up in the same way as the sweepings, and dealt with in the same manner.

Human corpses, and those of large animals such as horses, mules, etc., are buried or incinerated. Regarding the former, though it may be convenient for reasons of health to remove them as quickly as possible, since putrescence begins two or three days after the demise, they are nevertheless kept the time required to discern cases and symptoms of *latent life*, which frequently may occur in spite of the appearance of death. I must here call particular attention to the dangers proceeding from keeping in tenements, where villainous sanitary conditions prevail, bodies of those deceased. Such dangers justify a prohibition to keep the dead in such dwellings, and point out the expediency of establishing in each city ward adequate depositories for such purpose. On the other hand, though the city cemeteries and burial places of Mexico are, generally speaking, in satisfactory hygienic condition, still the system of cremation, so little used among us,

presents, from the viewpoint of the community's health, great advantages over inhumation.

If all that precedes did not suffice to show the great influence of defective evacuation of *débris* and lack of cleanliness, upon morbidity and mortality in Mexico City, I could quote very eloquent figures relative to the variations in mortality in some foreign cities, concomitant with the successive progress realized in their sanitation. For instance, Vienna, whose mortality was 80 per 100 in 1809, 40.1 for the period from 1851 to 1860, and lastly only 16.4 in 1911. "Brussels, where the water distribution dates from 1855, and the network of vaulted distributors dates only from 1875, the mortality of which keeps around 30 per thousand up to this last year and has been reduced to nearly half since then (31.1 from 1864 to 1868, 29.1 from 1869 to 1873, 25.7 from 1874 to 1878, 25.3 from 1879 to 1883, 23.9 from 1884 to 1888, 22.0 from 1889 to 1893, 19.4 from 1894 to 1900, 16.6 from 1901 to 1906, and only 15.3 in 1907). The abrupt drop since the period 1874-1878 will be noted."^{*}

As regards the provision of drinking water, since its relation with public health had been already studied in the chapter on "*Nutrition*," I shall here limit myself to emphasizing its importance in the dwelling, stating simply that *without water there can be no cleanliness, hygiene, or health.*

^{*} E. Macé, Ed. Imbeaux, Albert Bluzet, et Paul Adam, *Hygiène Générale des Villes et des Agglomérations Communales*, p. 138.

DAMPNESS

Humidity in the dwelling may proceed from the atmosphere or from the soil. In the chapter on "*Physical Characteristics of the Medium*," I stated, in general terms, the disadvantageous meteorological, geological, and topographic conditions of Mexico City, from the viewpoint of public health, and I arrived at some general conclusions in regard to the means of improvement advised, in such circumstances, by urban hygiene. In the following lines I shall try to restrict my remarks to the special case of the dwelling.

Though the hygrometric oscillation of air tolerated by man, without appreciable detriment to his health, ranges, as previously stated, between 25 and 80 hundredths of saturation, the grade of humidity most favorable for organic functions of pulmonary and cutaneous evaporation fluctuates between narrower limits and is principally subject to the rise in temperature.

According to Rübner, still air with 80 to 90 per cent. of relative humidity, is almost unbearable at 25 degrees. It accelerates the breathing, elevates the temperature, and provokes panting thirst, more from the need of cooling the body than from the necessity of replacing the eliminated water, of which there is little. For instance, "at 23 deg. a man 58 kilos in weight and at rest, who eliminated per hour 72.82 grams of water steam in dry air, of 7 per cent. humidity, could eliminate

only 18.7 grams in air of 84 per cent."¹ One lives and feels better in deserts with 45 to 50 degrees of dry heat, than at 25 or 30 degrees with the humid heat of tropical countries.

In short, *humid heat prevents cutaneous and pulmonary evaporation of the human organism, and for this reason, if its persistence be prolonged, may easily lead to anemia.* Be it remembered in this connection that, during the period from 1904 to 1912, there were registered in Mexico City, for the hottest months of the year, maximum humidities from 81 to 98 hundredths of saturation, in the shade, with absolute maximum temperatures of 28°.7 to 33°.1, conditions which coincide with those which Rübner considers as *almost unbearable*.

On the other hand, the humidity of the ambient air favors the loss of bodily heat through irradiation and conveyance. This loss is appreciable below the temperature of 15°, the variation of which Rübner estimates at 0.32 per cent. for each hygrometric degree, positive or negative. In the City of Mexico, the average humidities in the shade in the winter season, during the period 1904-1912, fluctuated between 47 and 59 hundredths of saturation, and the maximum between 80 and 100, with minimum absolute temperatures, of 2°.6 below zero to 2°.5 above zero.

Consequently, *the ambient humidity in Mexico, during prolonged spaces of time—several months*

¹ Rübner and Lewaschew.

per year—is notoriously prejudicial to health, because it is associated with temperatures which, when high, hinder the functions of breathing and cutaneous perspiration, and when low, provoke in the organism considerable losses of heat. Moreover, dampness always favors the breeding of microbes.

If we add that nearly all the old houses of Mexico, as well as the greater part of the new tenements—where the rapacity of owners seeks only scandalous gain—and many basements of wealthy modern homes, where servants and dependents are inhumanely lodged, are not designed to improve inwardly the outward conditions, but rather perpetuate or exaggerate the defects, we shall have strengthened the conclusions of our study of *physical characteristics of the medium*, in connection with the study of insalubrity in Mexico City. We shall also have made patent *the urgency of formulating and placing in execution a code of edification*, such as exists in some American cities, and of *prescribing not only the conditions of stability and strength of buildings, but also their hygienic conditions*.

VENTILATION, THERMALITY, LIGHT, ARCHITECTURAL COMPOSITION, AND DIMENSIONS

In truth, these five conditions tend, concurrently, to insure in the dwelling: the air composition, adequate temperature, and the easy access of solar rays.

Air Composition

The chemical composition of exterior dry air is as follows:

Oxygen.....	20.94
Nitrogen.....	78.09
Argon.....	0.94
Carbonic acid.....	0.03
Total.....	100.00

and in addition traces of hydrogen and other substances.

Lung breathing, cutaneous perspiration, and mephitic emanations of the digestive tube are very efficient causes of contamination of unventilated air. The most important of these is *breathing*, the process whereby the organism takes from the atmosphere the necessary oxygen for the combustions which uphold life, and expels the products of the said combustions: carbonic acid and water steam.

The noxiousness of confined air proceeds chiefly from the quantity of carbonic acid which it contains. The smaller the difference between the tension of this gas in the atmosphere and in vein-blood, the greater will be the gaseous interchange in the lungs, and asphyxia may result, not from the lack of oxygen, but "as a consequence"—as Beaunis states—"of the paralysis of the respiratory nervous centers, resulting from fatigue consequent to the exaggerated excitation of these centers by the carbonic acid."

Though the quantity of gas contained in the air may not be capable of producing acute accidents, it can nevertheless upon exceeding certain limits, render difficult the hematosis or conversion of venous into arterial blood, and can weaken the organism's resistance to infectious disease, notably tuberculosis, the germs of which are so abundant in dwellings. *It is generally conceded that 0.001 of carbonic acid is the highest limit admissible in confined air for breathing purposes.*

A man, at rest, emits about twenty liters of carbonic acid per hour; muscular efforts accelerate the activity of organic combustion, and double and even treble the volume emitted. The alteration, in this respect, which the air of a large *hermetically* sealed room of about fifty cubic meters would undergo, as the result of a person at rest remaining therein during ten hours, would be sufficient to increase the original proportion of carbonic acid (0.0003) to 0.0043, *or more than four times the conceded maximum of respirability of confined air.* If the said person, instead of being at rest, should be working muscularly, or if there should be two or three inactive persons within the room, in either case the resulting proportion of carbonic acid would be, respectively, *more than eight or more than twelve times greater than the admitted limit quoted.*

Nor is this all: man exhales also, through breathing, as well as through pulmonary evaporation, and through cutaneous eliminations, other un-

known volatile gases and steam. If we suppose, also, that within the enclosed room there burns, for some hours, a candle or petroleum lamp,^{*} whose combustion not only engenders carbonic acid, but also carbon oxide, which is much more poisonous—and can be tolerated in breathing air only at 0.00001, or a hundred times lesser quantity than carbonic acid; if we suppose that the room, with its only door, lacks ventilation, that there be still preserved a part of the two carbonous gases which I have mentioned, proceeding from the previous combustion of some logs used for heating, or cooking; if we add the smoke of two or three cigars, the decomposition in a place always damp, of putrescent sweepings, of urine and defecations, the mephitic emanations of dirty washing, of sebaceous secretions, and of gases from the digestive tube, and finally if we imagine that the three or four persons enclosed in the room only wash and bathe a few times a year, we shall have drawn in words a fairly accurate picture of the noxious atmosphere breathed at the hour of rising in the dens inhabited by the great majority of our lower classes. These poor people, far from restoring through hygienic sleep, the forces wasted

^{*} Albert Levy and Pecoul, experimenting with the air contained in a cylinder of 1.60 meters in height, and 0.55 meters in diameter, found that a stearic candle consuming 37 grams per hour produced, after five hours, 0.005 of carbonic acid, and vestiges of carbon oxide, and a petroleum lamp consuming 25 grams per hour produces, in the same five hours, 0.0234 of the first, and traces of the second.

by the arduous labors of the day, absorb the poisons contaminating the confined air of their sleeping rooms, which also serve for all the other intimate purposes of life and weaken still further their poorly fed organisms, becoming, as the result of anemia due to such deplorable conditions, a most fertile field for the development and propagation of all contagious disease, especially of *tuberculosis, which is preëminently the poor man's plague.*

Those who know only our capital and the pleasing lies bubbling to the surface of our complicated metropolitan life, which unctuously or criminally hide the sad truths to be seen through the thin veneer, may consider all that precedes as sensational exaggeration. To probe to the truth, however, will not even necessitate visiting some tenement of an outlying district, but simply an apartment house (*viviendas*) of some centric quarter, occupied by families in easy circumstances belonging to the middle classes. Let him who doubts look and smell into the den under the flight of stairs, or the basement under the hall, let him see the disgusting aspect, and encounter the fetid stench proceeding from the porter's family reeking in filth and squalor. This simple visit will be sufficient to dispel any suspicion of exaggeration which this writing may have engendered. To prove that I have proceeded in this work with the impartiality required, eschewing all that might smack of sensationalism, I emphasize the fact that

I have restricted my *exposé* to the mere physical ambient. The moral and mental influence *a fortiori* must be most deplorable, as a result of this frightful animal promiscuity of persons of different sexes, and ages, so common among the lower classes, which, unfortunately, is many times more pernicious than the mere physical condition.

Even the hypothesis of having the place *hermetically* sealed—the only object of which was to render the calculation more easy, and bring out the contamination produced by breathing in confined air—does not constitute, from the technical viewpoint, an appreciable alteration of the true condition of the problem. Besides the fact that the small quantity of air which might filter through the cracks of the door, might be more harmful than beneficial, through its very fitfulness, as a cause of colds—since it would be governed exclusively by the variable difference in temperature, exterior and interior, it is easy to demonstrate through a simple mathematical calculation, that such natural ventilation could not materially modify the results obtained from the foregoing hypothesis.

Let us again imagine four persons at rest, within the same room of fifty cubic meters' capacity—which we shall no longer consider as *hermetically* sealed. The relative formula is¹:

¹ Leclerc de Pulligny, Bouling, Courtois-Suffit, Levy-Sirugne, and J. Courmont. *Hygiène Industrielle*, p. 145.

The formula is thus:

Let there be a man emitting 0.02 c. m. carbonic acid per hour

$$t = 2303 \frac{C}{V} \log. \frac{200}{200 - (N - n) V}$$

in which:

C = individual capacity = $\frac{50}{4} = 12.5$ cubic meters.

V = volume of air entering from outside in cubic meters per head and per hour.

n = proportion in thousandths of the carbonic acid contained in the external air = 3.

N = proportion of the same carbonic gas, in thousandths, after t hours.

Solving the preceding formula for the case in which the value of N is equal to 10—that is, to the *maximum admissible limit of contamination of*

and dispose of a capacity of 3 cub. mts. with a ventilation of V cub. mts. of air per hour, containing

$$\frac{n}{10000}$$

of carbonic acid. Let R mts. cubic be the quantity of this gas contained in capacity C at end of time t , the consequent result being,

$$\frac{R}{C} = \frac{N}{10000}$$

the degree of contamination in that time. During the fraction of an hour dt following, R will increase with the carbonic acid brought by ventilation V :

$$\frac{n}{10000} = V dt;$$

plus the carbonic acid emitted by man:

$$0.02 dt;$$

less the carbonic acid carried by ventilation:

$$-\frac{R}{C} V dt;$$

and we have:

$$dR = (0.02 + \frac{n}{10000} V - \frac{V}{C} R) dt.$$

the breathed air, and for various values of V , we shall obtain the following conclusion: *that for renovations of air per head, and per hour of 5, 10, 15, and 20 cubic meters—difficult to reach in a regular and constant manner, through natural ventilation afforded by the cracks of an only door—we would reach the maximum possible contamination of confined air, by carbonic acid (0.001), respectively, at the end of:*

28 minutes	48 seconds
32 "	24 "
37 "	12 "
45 "	— "

Hence:

$$\frac{dR}{0.02 + \frac{n}{10000} V - \frac{V}{C} R} = dt,$$

integrating:

$$\log. \text{ nep. } (0.02 + \frac{n}{10000} V - \frac{V}{C} R) = -\frac{V}{C} t + K$$

For

$$t=0, \frac{R}{C} = \frac{n}{10000};$$

that is, at the beginning, the proportion of carbonic acid is the same within and without. Hence:

$$K = \log. \text{ nep. } (0.02),$$

and then, replacing

$$\frac{R}{C} \text{ by } \frac{N}{10000} \\ t \frac{V}{C} = \log. \text{ nep. } \left(\frac{0.02}{0.02 - \frac{N-n}{10000} V} \right);$$

and multiplying the two terms of the fraction by 10000 and converting the equation to ordinary logarithms, we have finally:

$$t = 2.303 \frac{C}{V} \log. \frac{2}{200 - (CN - n) V}.$$

that is, very small fractions of the time usually devoted to night rest.

But if the preceding did not suffice, we could, for instance, still employing the same formula, reckon capacities per head (C) which would require *that the contamination of the confined air through carbonic acid, should not exceed the maximum admissible limit* of 0.001, at the end of ten hours, with the small renovations of air considered above 5, 10, 15, and 20 cubic meters, per head and per hour. We should then find, that the individual capacities of room required would be, respectively:

263.160	cubic meters		
232.560	"	"	
200.000	"	"	
166.666	"	"	

considerably higher than that of 12.5 cubic meters per head, given in our example.

The figures given not only prove irrefutably, the vile condition of room and ventilation, in relation to the number of individuals, in the houses of the lower classes of Mexico, as well as many inhabited by the middle classes; but also prove the guilty tolerance of our Sanitary Code, Article 68 of which reads as follows: "*In tenement houses to be built or rebuilt, in hotels, inns, boarding houses, and public dormitories, all rooms will have at least twenty meters' cubic capacity and a door or window communicating with the outside air, and if this be impossible, then the ventilating apertures which*

may be necessary to ensure the easy renovation of the air. . . ." And Article 70, that: "*In hotels, boarding houses, inns, and public dormitories it shall be forbidden to house a greater number of persons than that permitted by the capacity of the rooms, so that each individual may have at his disposal, during sleep, the space of at least twenty cubic meters.*"

Our Sanitary Code falls into the double error of believing that a door, or window, or aperture, habitually closed when the room is used as dormitory, can ensure "the easy renovation of the air," and that twenty cubic meters per head suffices—without adequate means of ventilation—for a prolonged physiological sleep. Besides it exempts the tenement houses, the houses which most need it, from such provisions as are found in the very weak Article 70, against *unlimited confinement in dwellings, one of the principal causes*, as has been shown, of the increasing mortality in Mexico City. But after all, of what importance is the laxness or the insufficiency, however great, of these prescriptions, in view of the fact, generally acknowledged, that the Board of Health, at times through excessive indulgence, or through negligence, and nearly always through lack of funds, does not comply with nor enforce the regulations?

It is necessary, therefore, *to reform and amend the Sanitary Code, prescribing better conditions of ventilation for all dwellings, and limiting the number of persons living therein, using as a basis the*

cubic capacity of the sleeping rooms and their facilities for air renovation. It is even more urgent, whether the preceding suggestion is carried out or not, to endow the sanitary authorities with the aptitude and power needed to prevent effectively all inflections of extant hygienic precepts. In the United States and in many European countries, the sanitation of dwellings is backed by *modus operandi* of a most energetic nature.

It has been objected that among us the sanitary intervention of the authorities in the matter of tenement houses is extremely difficult, because confinement therein depends, chiefly, on economic conditions of the medium which could not be modified by all the sanitary codes in the world. I affirm, however, with a conviction based on facts, that from the days of the Conquest up to the present time many of the difficulties which have been opposed to the moral and material improvement of the *lower classes* have proceeded from the special protection that the upper classes have always found in these same laws and government regulations. Thus, we could cite cases of numberless tenement houses, horribly unhealthful, from which their owners derive enormous gains. Can we not see in the very omission of the said houses from Article 70 of our Sanitary Code, even though we may be reluctant to admit it, an iniquitous official protection of the material interests of the rich, at the expense of the moral and physical health of the poor?

Temperature

If we consider that the great majority of Mexican houses lack adequate means of ventilation, of artificial heating, and of refrigerating, and if we take into consideration the noteworthy influence that temperature combined with humidity has on public health, we must here acknowledge the justness of the conclusions contained in *Physical Characteristics of the Medium and Humidity*. I shall limit myself to setting forth in a few lines the noxious influence of abrupt changes of temperature aggravated by deficiencies of construction. The Mexican dwelling lacks those "transition compartments" such as halls, vestibules, etc., so noteworthy in American and European homes, which are so useful in avoiding the sudden change from a warm sleeping room to a cold and windy yard. The necessity of these abrupt changes, resulting from the structure of our houses, is the reason for our frequent, and at times fatal colds.

Sun-rays

The beneficial influence of sunlight on the healthfulness of dwellings is admirably expressed in the old proverb, *where the sun goes in the doctor keeps out*. Science has fully corroborated this through recent discoveries proving the microbe-killing action of direct sun-rays, and of even diffused sunlight. We well know the persistence of patho-

genic germs, principally those of tuberculosis, in obscure and ill-lighted places. Light has unexplainable but sure beneficial effects upon the organism and morale of mankind, and is one of the conditions necessary to cleanliness in dwellings. Hence the necessity of insuring, during the whole year, direct sunlight to all habitations.

Besides the natural and artificial atmospheric conditions, such as clouds, smoke, etc., another factor influencing the entrance of sun-rays is the architectural arrangement—that is to say, the situation, number, disposition, and size of the apertures, the situation and size of the courtyards, etc., and also the relative situation and elevation of neighboring houses, and the width of the streets.

The natural conditions of light in Mexico City are expressed in this fact: during the period from 1904 to 1912, the annual number of clear days varied between 90 in 1906, and 157 in 1908. The annual average for the nine years, was 126, or a little over a third of the total number of days. On the other hand, industry, due to its scant development, and also to the excessive prices of land, has been expelled beyond city limits, and fortunately does not produce appreciable defects in light.

For a house to be well oriented, it is necessary that the inhabited rooms, throughout the year, particularly during the morning hours, shall be directly accessible to the action of the sun-rays,

in order to secure the benefits of their microbicidal activity. The only orientations which, in Mexico City, satisfy this condition are, the east and the south. The west only partially satisfies this condition, and renders the dormitories besides excessively warm during the spring and summer. The north must be proscribed absolutely because it does not fulfill in any way the condition enunciated. The arrangement of the streets should be that which would produce the best distribution of the solar rays in all dwellings. Our capital, however, with its streets in north-south and east-west directions, must suffer from the original sin of its foundation, and, which is worse, from the inefficiency of our sanitary authorities, especially culpable during the recent epoch of our great expansion.

Independent of the width of the streets, or the depth of the courtyards, the quantity and quality of the sunlight penetrating into a room depend upon the size, locality, and shape of the windows. Experience has shown, according to Emile Trélat,² that, in order to have good conditions of lighting, the window opening must take up a *fourth* of the wall's surface. Its lower part must be as high as possible, at least at *two thirds* of the depth of the room. For a determined area of opening, it is better to develop it in height rather than in width. The only prescriptions contained in our Sanitary Code in regard to this are these: Articles

² Emile Trélat, *La Salubrité*, pp. 59 and 60.

68 and 69 exact that "there be in all tenement houses to be built or rebuilt, in hotels, inns, boarding houses, and public dormitories," at least a door, window, or opening, communicating with the outside air, and with an area equal to the tenth part of the floor of the room, but never of area less than a square meter. Therefore, the extant regulations, besides not including all the city's dwellings, are really insufficient in the face of what Trélat counsels as the result of experience.

The maximum height permissible depends upon the size of the court yards and the width of the streets. As to the first, not to be too profuse, I shall simply cite the case of Cologne City, in Germany, the municipal regulations of which, regarding hygienic requirements, may be adopted, as an average, for the regulations of European cities of about the same population as that of our own city. The said city is considered as divided into four zones. In the first, only four-story buildings are allowed, with twenty meters as the maximum height, leaving free from construction a tract varying between 20 and 35 per cent. of the total area of the land. In the second zone there can be only three-story buildings, with a maximum height of fifteen meters, leaving free an area from 35 to 50 per cent. of the total. Lastly, in the third and fourth zones the number of stories must not exceed two, and the maximum height of the buildings eleven meters, leaving without occupancy 50 to 60 per cent. of the total area of

the land. In the fourth zone besides, it is prescribed that two contiguous buildings must be separated by a free space of at least ten meters in width.

Article 63 of our Sanitary Code states: "The site of the yards and the disposition of the passages shall be such that ventilation and light be afforded to all dwellings, in keeping with the prescriptions of the respective regulations." *But up to date, fourteen years after the enactment of the said code, the foregoing regulations have not yet been issued nor framed.* We can all prove that the building in Mexico of many rentable houses has been controlled not by hygienic considerations, which have been utterly ignored or forgotten, but by an inordinate desire for gain. Let any one visit the cheap houses of the well-to-do colonies, and he will see how the ingeniousness of the builders, spurred by the avarice of owners, has performed miracles of architectural distribution, taking advantage of the last cubic centimeter of space occupied by the buildings. If we visit some of the tenements of the lower classes, in the narrow yards of which have been erected new and astonishing shanties, we shall recognize the inevitable and criminal coexistence of two facts: a considerable increase of rents for the owners, and a serious increase of unhealthfulness for the tenants.

Finally, the relation between the width of the streets and the height of the buildings, which will ensure for the latter the benefit of solar irradiations

to the extent of their height, is obtained theoretically according to Vogt's formula¹:

$$\frac{L}{H} = \text{sen. } (30^\circ + \delta) \cot. \alpha,$$

in which:

L = the street's width;

H = the height of the buildings,

α = an angle formed by the street's direction with the meridian, and

δ = latitude or angle of incidentalism of the solar rays.

Calculating the relation $\frac{L}{H}$ for the values δ of 8° and 98° —oriental declines approximately of the streets N. S. and E. W. of the City of Mexico respectively—and taking for α the value of $19^\circ 26'$, we get: for the first, that is *for the N. S., we would require a width of street equal to once and three quarters the maximum height of the buildings*; and for the second, that is *for the streets running E. W., there would be needed a width nearly twice and a quarter the maximum height of the dwellings*.

Article 62 of our Sanitary Code prescribes that: "The height of the dwellings shall be proportioned to the width of the streets, so that light may enter into all the floors, in accordance with the provisions of a special regulation." There has been no regulation subsequent to this article other than the following ruling passed at the meeting of May

¹ Emile Trélat, *La Salubrité*, p. 122.

29, 1903: "Subject to what may hereafter be enacted in the Regulations provided for in the Sanitary Code regarding the height of buildings, it is forthwith forbidden to erect constructions in Mexico City, on private property, of a height exceeding 22 meters, to be measured from the level of the sidewalk to the top cornice, and this maximum height must correspond to streets of more than 18 meters in width; in streets of lesser width it will be necessary to abide by the decision of the Director of Public Works." In keeping with the rule theoretically obtained from Vogt's formula, this height of 22 meters for the buildings could only be allowed in N.-S. streets of 38.50 meters, and E.-W. of 49.50 meters, which do not exist in Mexico City.

But if the legal precept is far removed from the theoretic, practice is still more distant from the former. The greater part of the large buildings recently constructed—like that of "La Mexicana," 25.50 meters in height, and situated on the corner of Francisco I. Madero Avenue, 13.09 meters, and José Maria Pino Suárez Street, 13.94 meters, in width; or house No. 85 Flamencos Street, 22.60 meters in height, in a street only 12.93 meters, etc., etc., are irrefutable proofs of the ease and frequency with which the rulings of authority are disregarded in Mexico.

CHAPTER IX

HOUSES OF THE FUTURE

WE can affirm that the tenements and lodging houses of Mexico, homes of the great majority of the metropolitan population, are indeed sinks of physical and moral infection. If the preceding pages, which show innumerable infractions of the most elementary laws of hygiene, were followed with a recital of the scandalous scenes of popular life, pictured daily by the newspapers as taking place in such dwellings, we should have to own that these houses are, besides, the theater of all vices and all crimes.

In face of the powerful atavic influence, and the still stronger influence of the unhealthful and immoral ambient of the tenements, to which the children of the lower classes are at all times and from earliest childhood exposed, we may well ask: what can be the influence of a school, as a rule, poorly endowed with technical and material facilities, with a curriculum of doubtful efficiency, provided with incompetent teachers, to which the children are *compulsorily* sent for a few hours daily, during the so-called school years? Peda-

gogy must inevitably fail in its noble purpose of rescuing our people from perdition and utter degeneracy, if it does not strive to modify the first environment of the child, extending its beneficial action to the house or home. The problem concerned with the salubrity of the lodging and tenement is not therefore a mere question of Sanitary Engineering, but likewise includes all questions connected with the health of the dwellers therein, both of soul and of body.

Having thus stated the dwelling problem for the poor in Mexico, we must also consider it in order to ensure its technical solution, from the financial point of view. The first obstacle to its solution is the money lust of owners. We must therefore depend, for the initial effort, upon philanthropists or high-minded capitalists. Following them economic competence will undertake to realize the miracle.

Imbued with this idea, about two years ago I formed the plan for a tenement house, striving to harmonize the architectural arrangement with the three necessary conditions—sanitary, pedagogic, and financial—in order that I might propose it to the administrator of a large estate devoted to works of philanthropic intent. I cannot here insert the project, having retained no copy thereof, and shall limit myself to transcribing a sort of letter-monograph connected with this project. Upon publishing it here I have stripped it of the personal character which it possessed, addressing

it as an open letter to all philanthropic institutions—which in Mexico handle many millions of dollars—and to every owner who may care to forget his selfish past and in the future fulfill his duties to the race.

The letter follows:

“MY DEAR SIR:

“After our last conversation, during which I took the liberty of presenting to you some general ideas upon what were in my opinion the best methods of utilizing the funds bequeathed for works of philanthropy, by the benefactor Mr. —, I had the good fortune to run across, while reading a book of the famous Italian educator, Maria Montessori, the description of the Roman Institute of the *Beni Stabili* which confirmed almost literally the ideas discussed in our conversation. So fortunate a coincidence gives my ideas the theoretic and practical sanction of an acknowledged authority in the matter, whose conclusions are based upon the experience of many years.

“As the need among us is even more crying than at Rome, in view of the great moral and material backwardness of the awful Colonia de la Bolsa in Mexico City, much worse than the San Lorenzo quarter in the Italian capital, I shall limit myself in the course of this letter to the translation of paragraphs relative to the book mentioned, and shall urge only that if this institution has in

Rome fulfilled a *great* mission, then its establishment in our midst becomes *most imperative*.

“Signorina Montessori goes on to say:

“The great idea of Talamo was to pick up all the children from three to seven years old, living in the tenements of a great building, and to group them in a hall, under the care or vigilance of a female teacher living in the same building.

“Thus each one of these huge tenements had its private school. The *Beni Stabili* Institute found itself in possession of four hundred old Roman palaces: the work possessed marvelous possibilities of development. The first school was to be founded in 1907, in a great tenement building of the San Lorenzo quarter, containing nearly one thousand persons. In this very quarter the Institute already owned fifty-eight buildings and according to Talamo could soon count sixteen schools in these buildings.

“This particular school was named by Signora Olga Lodi, a common friend of Talamo and mine, with the charming appellation of *Casa dei Bambini* (Babies' Home). The first school was inaugurated under this name, on the 6th day of January, 1907, in the Via dei Marsi 58, and entrusted at my recommendation and on my responsibility to Signorina Candita Nuccitelli. I did not overlook the social and pedagogic importance of such an institution. I understood at once all its magnitude, and I may then have seemed oversanguine in my

great expectations of a triumphant future. Now, my hopes are being fulfilled.

“On the 7th of April, 1907, there was opened another *Casa dei Bambini* in this same quarter of San Lorenzo. On the 18th of October, 1908, we established the *Humanitario* in the working district of Milan, while the *Casa di Lavoro* of the same society undertook to manufacture the teaching material. On the 4th of the following November there was opened at Rome another *Casa dei Bambini*, no longer in the poorest districts, but in a great apartment house of the middle class in Tamagosta Street, and in January, 1909, while I am writing these pages, in Italian, Switzerland has begun to transform its asylums for children, organized formerly according to the Froebel method, into *Casa dei Bambini*. The *Casa dei Bambini* has a double importance, a social importance, due to its form of “house school,” and a pedagogic importance because of the methods of education inaugurated by me.

“As a direct civilizing influence upon the people the *Casa dei Bambini* would deserve a special volume. It solves, as a matter of fact, more than one social and pedagogic problem, the solution of which seemed utopian, and has been an agent in the modern transformation of the home.

“The San Lorenzo quarter is famous; all the newspapers of the capital speak of it daily; it is *par excellence* the *poor man's quarter*; the home of

the honest and ill-paid workman, often of those *unemployed* as the result of ill-luck or laziness, of the delinquent or those who have transgressed because of lack of opportunity or preparedness.

“The San Lorenzo quarter dates from 1884 to 1888, when the building boom reached a kind of paroxysm along the banks of the Tiber. The speculators were certainly not guided by hygienic or social preoccupations. Their purpose was to cover with walls the greatest possible area of land, so as to receive coveted subsidies from banks and from the State. As these buildings were never intended to be used by those who built them, their future was bound to be disastrous.

“After the crisis, these houses remained uninhabited for a long time. Then, little by little, they began to fill up with tenants, and as the owners of the properties were loath to add new capital to what had already been lost, these buildings, which were deplorably anti-hygienic and most hastily put together, did not undergo the slightest repair, housing in this condition as many families as it was possible to huddle into them. The apartments or tenements not having been built for the lower classes, were too large; it became necessary to sub-rent in order to live. The tenant who has an apartment of six rooms for a monthly rent of eighty liras, sublets a room for ten liras per month to those that can pay, or a corner of a room, perhaps the dining-room, to the less fortunate. In this way, thanks to the subletting,

the tenant can make forty liras per month, and get his rent free. This is usury; the tenant thrives on his neighbor's wretchedness. To this evil we must add those which are caused by agglomeration, promiscuity, immorality, and crime. The newspapers make daily word pictures of such dens, where a numerous family lives in the same room, boys and girls together, while some woman not belonging to the family, shamelessly and in presence of these children, receives some lover or lovers in a corner of the same room. Quarrels of sexual jealousy break out, and opprobrious epithets are bandied from bed to bed, leading to blows, bloodshed, and the intervention of the police.

“If one penetrates into any of these dwellings, a feeling of repulsion and hopelessness takes possession of him. The wretchedness which one sees is not that of one's imagination, or as it is seen in the theater. It is a black abyss. What is most depressing is the utter darkness. Finally, when the sight can discern something one sees a cot containing a sick person. If one comes to minister to the needy, in behalf of some philanthropic society, and it is necessary that some receipt be signed, a candle must first be lighted. Often we speak of the great social questions while never having observed the evils through personal investigation. We talk of having the pupils write and prepare some of their tasks at home, utterly oblivious of the fact that in that case they would

have to write on the floor. Without really knowing their needs, we wish to establish circulating libraries, to distribute among the poorest, educational and hygienic pamphlets of propaganda. The greater part of them have no light whereby to read. For the proletariat there is one awful gripping need, coming before all else: the problem of existence. The children born in such circumstances do not "come to light" but to pitch darkness. They are brought up there, breathing, mentally and physically, the poisons inherent to human herding. They are raised in filth and squalor, because the water available for an apartment suitable for three or four persons, wherein ten or more have been crowded, scarcely suffices to allay the tenants' thirst.

"Nothing is more sacred than the English home; it is the enclosed temple of intimacy; in it all the most refined and elevating sentiments uplift souls who there find solace and refreshing peace. If we reflect upon the chasm existing between such homes, and so many others, it seems cruel to demand of all the same love for home. How many wretches do not know even the meaning of the word "home." What they have seen is the enclosure formed by four walls reeking with filth, where the highest intimacy must perforce be absent, where everything is performed in the presence of everybody else; a place destitute of air, light, and water. Therefore we see why this term "home" is but an abstract entity. Before

we can strengthen family ties, the greatest basis of human society, we must first create the home.

“For those who inhabit such squalid surroundings, the street becomes the parlor, and into it swarm the children. And how often is the street the theater of crimes, fights, brawls, and all manner of vile exhibitions! The newspapers tell us of women pursued by drunken husbands armed with knives; of young girls trembling from fear, chased by young ruffians, who throw stones at them, or worse. There are deeds even more dastardly committed, over which decency compels that a veil be cast. We know of miserable women, stupefied by drink, assaulted by hoodlums, who after throwing them prone into the gutter, leave them to be found in a shocking state of nudity by a band of street “arabs,” who pull them about, and mock them with much show of ribaldry and vileness.

“Spectacles so disgusting that men in a savage state were ignorant of them happen daily at the doors of the cosmopolitan city, the mother of civilization, the queen of fine arts, the Eternal City! This is possible, because of a new fact, unknown in former ages: the segregation and removal of the poor classes.

“During the Middle Ages the lepers were isolated; the Jews locked up by the Catholics. However poverty was not considered as a danger, and an infamy which it became necessary to consider from afar. The poor lived near the rich. This

contrast, with the palace robbing the light of the hut, between the bloody drama taking place in the garret, while fashionable dancing graces the brilliant hall, has inspired the genius of many a great writer, among others Victor Hugo. Popular romance, to point a moral and adorn a tale, was pleased to show the princess sending substantial help to the neighboring hut, or depicting the daughters of the rich giving of their surplus to the wretch in the garret. Now the poor can hope for practically nothing from the rich. Even the few crumbs of other days have been taken from them; they have been herded as far away from us as possible, outside the city walls; outcasts left to grovel in despair among the frightful schools of brutality and sin. Thus have been formed sinks of iniquity, a cankerous growth threatening the city, which has attempted to clean its interior streets of all that was ugly, but which has fostered venomous growths to rankle and fester it, in spite of the blindly selfish efforts of an aristocracy enamored of beauty and the ideal. When I journeyed for the first time in these new quarters, I felt as if I were in a city which had undergone some terrible catastrophe. They look like the remnant of a city, with streets bordered by immense edifices, isolated, in spite of their nearness to the capital. It seemed to me as though some great bereavement afflicted these people who went about sullen, downcast, and silent. The silence might have meant the interruption of some col-

lective life. Not a carriage went by, no voice was heard, not even the jarring tones of some discordant barrel organ trying to worm a few cents from the dejected herds. These things, forbidden within Rome, as being signs of shiftlessness, and stunted civilization, did not even wander here to solace the reigning overwhelming misery.

“ ‘Seeing the streets so unevenly paved with huge stones jutting out irregularly, one might have thought that some flood had washed away the earth. Upon seeing the houses dismantled with uneven walls, one might rather conjecture that some earthquake had ravaged the land.

“ ‘When we note that there is not a single shop in these quarters, not one of those minute emporiums where we can find for a low price articles of first necessity, but only unclean cafés and saloons, opening upon the street their reeking maws, then we realize that the only compelling disaster is mental, and that it is poverty and vice.

“ ‘Such an awful state of things, daily feeding the catalogue of recorded crime, has excited the finer feelings of noble souls, since fortunately it is the redeeming characteristic of human nature, that sometime, somewhere, it seeks to remedy existing evil. And thus we have seen that asylums of all kinds have been established, free dining-rooms, and hospitals by which commissions of public health have striven to combat the unhygienic condition of the dens.

“ ‘This of course is only a slight palliating

beneficence. The magnitude of the evil would require some redeeming work on the part of the community. Only some great social work, which through the good done to others might be strengthened and enriched by the very well-being which it generates, could, taking up its quarters in this district, realize a truly redeeming action.

“ ‘Such is the great work of the Roman Institute of *Beni Stabili*, inspired by the most modern social principles, directed by Engineer Eduardo Talamo, and which owing to the wealth at its disposal has no equal in Italy, nor in foreign parts. It is three years since this Institute was founded at Rome; its program was to acquire real estate in the city, improve it, and paternally administer the buildings.

“ ‘The first acquisitions comprised a large part of the San Lorenzo quarter, where the Institute possesses at present fifty-eight houses, occupying an area of nearly 30,000 square meters, comprising, besides, the ground for 1600 dwellings, capable of housing a large number of families. Thus the reforms attempted through the *Beni Stabili* can be carried on in a much larger way.

“ ‘The Institute understanding that it could not keep up these old houses, badly built, and anti-hygienic, decided to transform them gradually. The architect was to give a new value to the real estate, and its hygienic and moral transformation, improving the conditions of existence of the occupants, would surely ensure the increase in the

number of tenants. The Institute established a system which permitted it to evacuate, gradually, such houses as were to be repaired, so as not to turn into the streets at one and the same time the whole population of the quarter. The redeeming work could hardly proceed more swiftly. In this way, the Institute has, up to the present, been able to overhaul only three of the huge buildings, in accordance with the basis of its program, which is as follows:

“(a) To demolish in the building all invading appurtenances which take up room in the yards, and which render the dwellings unhealthful by robbing them of air and light. The skylights and all narrow light apertures were abolished; in their stead have been created long and roomy courtyards, to which all the rooms have access.

“(b) To build new stairs, and distribute the dwellings in a better fashion, restricting them to one, two, or three rooms at most, with kitchen.

“The importance of such transformations is of course immense, not only for the gain of the owners, but for the material and moral well-being of the tenants. To increase the number of stairs means to facilitate circulation, and reduce the damage to property caused by the constant passage of masses of human beings, with no respect or care for property belonging to others, and little addicted to order and cleanliness. It also tends to reduce the personal contact among the tenants,

especially during the night, and this has a very great moral value.

“Subdivision, or the transformation of the large apartments into small ones, completes the work, isolating each family, and suppressing sublettings and their host of untoward consequences. It also eliminates usury and speculation, with which the old system was so fraught, and at the same time it increases the proprietor's profit. When an owner rented in the old days an apartment of six rooms for eighty liras per month, he could greatly increase his income if this amount of space were subdivided into three small apartments, clean and attractive, each one comprising a kitchen and a bedroom.

“Another great moral advantage secured from such reforms is the awakening, in the hearts of all these poor outcasts, the sweet sentiment for a sheltered home, removed from the violation of outsiders.

“But the purpose of the Institute is not only to obtain a home for each family; it wishes besides that such a home be kept clean. Naturally to attain such a result it is all-important to secure the coöperation of the tenant. The most careful tenant receives a prize. By this means is assured the competition of all the tenants of the building to secure the greatest cleanliness, comfort, and the best hygiene. Previous to the present time such a system had never been put in operation. Nevertheless, we see it in Rome yielding most

astounding results. The building where the second *Casa dei Bambini* was inaugurated, after having been for two years under the exclusive protection of the tenants, could as far as conservation be concerned, serve as example for more than one family of the middle class.

“Thus, besides the sentiment for home, the people are unconsciously taught the love of cleanliness, which forms part of the esthetic comprehension. This latter is increased by means of natural decorations costing little, such as plants and flowers for the windows, and trees for the yards. Thence springs a new source of pride for the tenants; the creation of the esthetic instinct; not only do they have a home, but they know how to live therein, and to make it respectable.

“Cleanliness of the home will of course produce cleanliness of the person. How could a dirty piece of furniture be tolerated in an otherwise clean house? Where all is a feast for the eyes, there springs up the wish for scrupulous personal cleanliness.

“The establishment of baths has been a very great reform. Cleanliness is next to godliness. Each building possesses a special department, with bath, and hot and cold showers, where all tenants may bathe in turn. Who will deny the great advantage of the warm bath at home, and its superiority over public baths, nearly always in a doubtful hygienic condition? Thus the old dens of squalor are opened, materially and morally, to the benefits of civilization and hygiene.

“‘However, in the realization of its noble task, the Institute found a serious obstacle in the children too small to go to school, and always little looked after by their fathers and mothers. They became in consequence rather destructive to property as a result of their childish and irresponsible activity, an activity provided by nature to ensure their development. Then a new reform arose, the most brilliant, the most serious, the most pregnant with result: *The creation of the Casa dei Bambini.*

“‘*Mothers can send there all children under usual school age.* Watched and well taught, these little ones will remain in the *Casa dei Bambini*, saving the mother the work of looking after them. Still this work cannot be realized without the coöperation of the parents. The Regulations on the wall show the conditions necessary for entrance into the *Casa dei Bambini*:

“‘*Mothers must send their children here in a condition of cleanliness, and coöperate by all means in their power in the work of redemption by the Lady Director.*

“‘In this there is a double duty: the physical and moral care of the child. If, through his acts or words, a child endangered or harmed the work of the school, through the evil influence exercised upon him by his family, he would be expelled and would fall back to the care of the parents. The oaths, the disputes, and the brutal acts of the fathers would force these to feel at once the weight of all

these small lives, so tenderly beloved, which would be deprived of all the moral care of which they stood in such dire necessity. It is necessary, therefore, *to learn* to deserve the boon of having a school at home.

“The mothers must visit the Lady Director once a week to report concerning their children. These talks can have a double advantage, because the teacher, counseled by the doctor always in attendance at the school, is enabled to give the mothers, not only advice of educational value, but even hygienic and practical suggestions.

“The management is always at the disposal of the parents. The teacher, who, according to the Regulations, is compelled to live in the same building as the pupils, being a person of higher education and culture, is necessarily capable of exerting a deep influence over all the tenants of the building. A true missionary among all these people in a semi-savage stage, the teacher, if possessed of tact and good judgment, will reap most unexpected fruits from this admirable social duty.

“Philanthropists and idealists had striven before to live among the poor with the idea of helping to better them, but the trial had ever failed. To reach such ends in a practical manner it is necessary to make the habitation of the poor cleaner, more hygienic, better ventilated. As at Rome, such ends can be reached only through moral competition, and the awarding of prizes.

There is no other way of making the poor accept the yoke of civilization.

“‘The *Casa dei Bambini* is not an asylum. It is a school whose methods are inspired by the rational principles of scientific pedagogy. To the school, properly so called, it is intended, so far as possible, to add baths and *toilets*, and a stretch of land which the children may cultivate. What it is important to show, is the pedagogic progress realized by the *Casa dei Bambini*. No educator is blind to the fact that it is of the greatest importance to harmonize the school's influence with that of the home. It is not possible to always depend upon the latter. Here for the first time we see our ideal realized, because of *the school in the home*, which becomes little by little the collective property of the parents. The sentiment of collective property is always sweet to the heart.

“‘Mothers who can constantly observe what is going on in the *Casa dei Bambini* soon end by fairly worshipping the school and the Directress. How often does the latter find at her window sweets and flowers as tokens of heartfelt gratitude from fond mothers! And when after three years in such a school, the children then have to enter the establishments of primary education, their mothers, hitherto accustomed to exercising a physical and moral inspection, must perforce continue such overseeing which has become second nature to them.

“‘Another progress realized by the *Casa dei*

Bambini is along the lines of scientific pedagogy. Since man is not only a biological product, but also a social being whose first ambient is the family, scientific pedagogy will strive in vain to improve coming generations if it does not find a way to act upon the very medium wherein children are growing. All application of scientific hygiene would prove worthless if the home were to remain sealed to progress. To open up to moral and material light, the old building, badly built and full of blemishes is in my philosophy the true starting point of scientific pedagogy.

“Moreover the home thus transformed has another quality: it has been socialized, that is to say, all the mothers can enjoy equal advantages and feel their children upon a footing of equality.

“Until now, only great ladies had been able to entrust their children to the care of a governess or children’s maid. To-day the women of the people are in an analogous situation; as in the most princely dwellings the home doctor looks after all these little ones and observes their development. The ladies of the English aristocracy and gentry possess a “mother’s book” wherein they jot down from time to time the principal measurements of the child; in Rome, the workmen have the “biographic certificate” of their children, compiled by the teacher and the doctor.

“We already well know the advantages secured from the socialization of certain objects: the carriage transformed into tramway, the candle

into a lamp, or gas jet. Never had persons been socialized: the governess and the children's maid.

“‘The *Casa dei Bambini* have given this example. It fills up a long felt want. It cannot be asserted that it is the wish for comfort and ease which induces mothers to give up caring for and washing their little ones. Economic and social evolution obliges the working-woman to leave her home in order to earn the bread necessary for her little ones, and to waive the privilege of fulfilling duties which would be sweet. It is a great solace for her to know that her children are well looked after. This work is not restricted to the children of the working classes: it is extended also to the middle class, where the mothers are also “workers in thought.” The women teachers of every kind, professors, etc., who besides their official courses give private lessons, are frequently compelled to leave their children in the hands of a rough, benighted, utterly incompetent servant. Hence the fact that after the inauguration of the first *Casa dei Bambini*, the *Beni Stabili* were invited repeatedly to organize similar schools in other parts of the city.

“‘Upon seeing socialized in this manner a maternal function, some mayhap will ask: what is to become of the home if the mistress of the house no longer gives it the same care as formerly? But the home is also transformed accepting these new functions.

“‘Later, other improvements will also be made.

Among these we must propose the "dispensary in the home," permitting the various members of the family to go about their business, while their patient is well looked after in the home. Hygiene and prophylaxis will gain in any event, and there will no longer be reason to distrust those disinfections, perfunctorily gone through, after cases of diphtheria or typhus.

"In the United States of North America, even the kitchen has been socialized; the food is sent up to each apartment or tenement by the dumb-waiter. This is a most valuable modern improvement for the families of the middle class, where a shiftless cook can spoil the meals time and again.

"The home thus transformed, will become school, bathing establishment, and infirmary. It would also be highly desirable that a reading room might be connected therewith furnishing a place where the male members of the families might go to improve their minds, instead of letting their leisure cause them to drift to far less desirable places. Then would the gaming houses and drinking booths close up their dens, because their former patrons would no longer find them the one and only panacea!

"There is tangible reason for dire forebodings of the breaking up of the home, if the woman should work outside of it. In its evolution, the home tends to assume a higher, more serviceable mission than the comfortable, *cosy home* of the English days that were. The home is no longer

a putting together of clean, attractive, well painted walls, behind which the family shelters its sorrows and its joys; it has become a living thing, the soul of a woman—of an educator. It gives forth life and well-being; it educates the children, brings rest to the weary toiler, and a feeling of happiness which is a joy forever to all. It is a soother, "and a comforter through the strenuous vale of life."

"The new woman will free herself of all that dreary petty host of trivialities which caused her to be desired by man, that he might shift onerous burdens upon her patient shoulders. After she becomes a worker in the social beehive, she, as much as her husband, will need a home wherein she may find comfort and solace. She will yearn to be loved for herself, and not for the sum of drudgery which she may be able to wade through. Human love is not made merely to beget physical comforts, but to fecundate the forces of the spirit, rendering it almost divine.

"Friedrich Nietzsche has embodied the quintessence of true love in the mate of Zarathoustra who, yearning to have a child superior to herself, asked of the male:

"Wherefore dost thou desire me? Mayhap because of the dread of solitude? . . . as a protection against the *tedium vite* . . . ?

"If so, go! I hunger for a man who may have overcome self, and who may have wrought out from such beginnings as were vouchsafed to

him a truly great soul. I shall love the man who has preserved his body in beauteous strength. I shall love the man who will blend his soul and his body with mine, that we may bring forth a son, more perfect, stronger than those who gave it life."

"To consciously improve the species, cultivating its health and its virtue, such is the task. This is the sublime idea which in our earthiness we overlook, or perhaps sneer at.

"The house of the future, socialized, a living thing, sweet, educating, and consoling, shall be the true nest of human couples who may wish therein to improve the species, and launch it triumphantly forth down the ringing grooves of time.'"

CHAPTER X

URBAN TRANSIT

THE transit of people and animals through the streets, public places, etc., produces numberless occasions for contagion, direct or indirect, through contact, or through pathological products—saliva, scales, etc.—of the sick or convalescent, or through the intermediary of certain insects and parasites, such as flies and fleas. As the principal sources of contamination have already been examined in some of the preceding chapters—*Winds, Living Beings, The Dwelling*—I shall limit myself in closing the study of the component factors of the urban medium in Mexico to cursorily setting forth some special considerations relative to the most frequent and most important causes of contamination in the streets, and their effect upon public health.

The street, well do we know it, is a constant receptacle of animal *detriti*, of sweepings of all kinds,—containing fermentable organic matter,—and of various objects, more or less pulverized by traffic and circulation, and mixed with the product of the pavement's wastage, thus forming *mud*

and *dust*, as it may be wet or dry, the whole being ground into small particles.

The pathogenic germs proceeding from animal *detriti* contained in the mud or dust may be of intestinal or urinary source, due to the frequency with which the street and highway receive urine and fecal matter from animals, children, and individuals of the lower social strata. These germs include *the coli bacillus*, *the Eberth bacillus*, *the Koch bacillus*, *the cholera bacillus*, *the dysentery bacillus*, *that of infantile diarrhæa*, etc. They may also proceed from the mouth, or from the lungs, and may be thrown on the street with the expectorations of the wayfarers. These are *the tuberculosis bacillus*, *the pneumococcus*, *the germs of scarlet fever*, *of diphtheria*, etc. They may also proceed from the skin, contained in the epithelial particles shed from the sick afflicted with *scarlet fever*, *pox*, etc., during the period of desquamation.

Mud and dust—the accumulation of which grows in proportion with the traffic and the lack of resistance of the pavement—moved continually about through the transit of carriages, pedestrians, animals, etc., and by the action of the winds, can therefore extend everywhere their contaminating influence, infinitely spreading the dangers of contagion. We must remember that only a *fifth part of Mexico's streets is asphalted or paved with stones in the proper way. The rest is protected most inadequately, or destitute of all resisting protection, and the public service of watering and sweeping*

the streets is restricted to those which are asphalted. The rest are left to shift as best they may, and their cleanliness is such as they may receive from the tender mercies of the proverbially lazy neighbors. Remember also the notorious habits of uncleanness of our lower social strata—who rarely bathe, wash, or change their clothes and underclothes; who expectorate, urinate, and dump refuse anywhere—and we shall be compelled to recognize that the bad class of paving, the manifest deficiencies in street cleaning service, and the total lack of hygienic education among the people, make of the urban circulation and traffic in Mexico—though it is impossible to exactly appraise their effects—one of the principal causes of its morbidity, and mortality.

IV

General Recommendations

CHAPTER XI

GENERAL RECOMMENDATIONS

READING the preceding chapters must impress upon the mind of any one who has some knowledge of the country, the conviction that the component factors of the urban medium of each one of our cities are of great importance—especially such as proceed from the social agglomerations, that is to say those which exert the greatest influences upon public health. These are, with very slight differences, the same as those analyzed when we studied the particular case of the City of Mexico. It is inevitable that the same causes of insalubrity will be discovered. Their relative intensity may vary somewhat, but they will always appear in such preponderance, that one may safely conclude that the immense majority of the national urban population is similarly affected.

The mere enumeration of these recommendations, counsels a classification in three distinct groups, and the condensation of each one of these, in the three following "General Recommendations":

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I. *To organize efficiently the sanitary administration of the Republic.*

II. *To decree: Compulsory sanitation for every city the mortality of which exceeds the maximum limit of tolerated contamination, and*

III. *To elevate the moral level, as well as the economic and intellectual levels of the popular classes.*

Facing the impossibility of enclosing within the narrow limits which this publication must observe, the detailed and complete development of the vast questions which I have enunciated, I shall content myself in order to close, with stating briefly in the following pages, the fundamental considerations which, in my opinion, might serve as basis for the rational solution of these questions.

CHAPTER XII

EFFICIENT ORGANIZATION OF THE SANITARY ADMINISTRATION

THE Executive Power, in order that it may duly fulfill the political and administrative functions with which it may be entrusted, must of course develop its activity in several, very clearly defined directions, through appropriate and special departments. For the proper carrying on of its affairs with the other countries of the globe it has the *Department, Secretary, or Ministry of Foreign Affairs*. For its defense against possible attacks from the same, or against internal troubles, it has the *Department of War*. In order to establish tribunals adequate to fulfill their task, it has the *Department of Justice*. For the proper management of its finances it has the *Department of Finance*, and finally for the purpose of improving and fostering the physical and intellectual well-being of its citizens, it has the *Department of the Interior*.

This classification includes logically, all forms of the executive activity of the administration. In practice, however, the reigning political and social tendencies, giving a character of absolute

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preponderance to certain necessities and social or national aspirations, produce new differentiations, especially, in the matters comprised in the last group. Thus specialized, these departments determine the birth, by an almost biological process, of other independent organs. Thus, probably, sprung up among us, the departments of Interior Development, Colonization, and Industry, that of Communications and Public Works, and that of Public Instruction and Fine Arts, though the latter has never yet been able to extend, in an effective manner, its jurisdiction outside of the federal district, and the territories. Moreover, due to the country's crying need of *Agrarian Reforms*, the régime of the Huertian Usurpation—masquerading as a liberal government—subdivided the first of the departments aforesaid, into a Department of Commerce and Industry, and a Department of Agriculture. This last organ was doomed from its birth—notwithstanding its perfect theoretical justification. An illegal, short-lived, so-called government had brought it forth, and it was destined to be but a tool for the designs of capitalism. But assuredly such a department could justify its creation, and thrive in the atmosphere of justice which we hope for, as a result of the triumphant revolution.

When we consider that the first factor necessary for the realization of the high aims of the administration, is no other than a condition of healthfulness among the masses, what must we add to the

evils described in each page of this book, to demonstrate the imperious need of a special governmental department, which shall have the power and the spirit to eradicate these evils, or at least to lessen them. Then at last we may hope for industrial prosperity, for commercial and agricultural activity, for an effective army, and, in a word, for national autonomy.

"The federation of certain sanitary services," says Doctor Rafael Norma, ex-Secretary of the Board of Health of Mexico City, "is practically inevitable. The state has the right, and must protect the confederate, securing the extinction and avoiding the propagation of epidemic disease, or of endemo-epidemic illnesses which may be ravaging one of the states of the Union. These have banded together for mutual help and benefit, to ensure their integrity and facilitate their development, and as soon as there springs up in one or more contiguous states or territories some plague threatening to spread beyond its limits, if neither the state or states affected, nor those threatened, have the necessary resources and are unable to exercise coördinate action for circumscribing the danger, then upon the Executive Power of the Union, with its more ample and strategic jurisdiction, will devolve the duty of going to the rescue. In the same way the state or states menaced or plague-stricken, have the right to request the same assistance and to have it imparted to them.

“Unless we can find the way to federalize the service of public health and sanitation, we shall not be able to touch upon even slightly the medical geography of infectious diseases, which is requisite to the establishing of a knowledge of the geographical distribution of the flora and fauna of microbes and parasites; or to institute a record of national medical statistics, which is, of necessity, the beginning of any and every measure to remove the causes (ethnic, social, moral, material, economic, etc.) which determine avoidable diseases, and which cast races into physical and intellectual depression; or to acquire even the rudiments of mesology, that inevitable forerunner of every precept which tends to lessen the pernicious effects of the cosmic medium upon the human being.

“Sanitary measures affect, or are so intimately connected with the other branches of public administration, that many of them cannot be placed in practice without the concurrence of one, or of all the departments of state, whose jurisdictions must frequently be invaded by the rulings of the sanitary authorities. The latter cannot proceed with the efficacy and diligence necessary, without the acquiescence of the former, therefore it becomes imperative that the representative of said authority be in intimate and frequent contact with the other functionaries of the government, in order that they may proceed in each case with the required promptness, energy, and decision. All this constitutes an additional reason for uphold-

ing in Mexico the expediency of creating a special Department of Public Health, which would assume the duty of watching and enforcing the laws and regulations for the protection of public health. In this case the council of ministers, which convenes as often as necessary to study and pass upon matters of the greatest importance, and upon all projects of special legislation, would fulfill, when necessary, the functions of the Board of Public Health."

The example of the Republic of Cuba, in this respect, is most eloquent. Upon constituting its own independent government—after the Spanish-American War—there was formed the Department of Sanitation and Beneficence, and no one can possibly doubt or question that the awful conditions of health and sanitation which obtained in the Island of Cuba and Havana have been enormously improved in a very brief space of time.¹

Moreover the remedy contained in the second of the *General Recommendations* which I am analyzing—and which will be the object of the following chapter—will prove of much easier and surer application, under the form of organization proposed. The fulfillment of the *decree of compulsory sanitation for every city the mortality of*

¹ It having been considered unnecessary, the English edition does not include Annex No. 4 of the Spanish edition, containing the part referring to said Department in the Organic Law of the Executive Power, and Regulations for the Government of the Departments of State of Cuba, January 26, 1909.

which exceeds the maximum limit of tolerable contamination, will give rise to two principal forms of activity; first, the collecting and studying of statistical data upon which decisions are to be based—very numerous and of very variable character—which must be noted by the Sanitary Authority, in each case, for the better protection of the health of the inhabitants; second, the execution or inspection of the required works of urbanization. Assuredly such activities, of so complex a character, and extending over so vast a field as that offered by almost all the cities of the Republic, could not be carried on satisfactorily save through an administrative organism the importance of which would equal, or perhaps exceed that of some of the present departments of state.

Whether the sanitary administration of the republic be raised to the rank of a state department or not, the need is most obvious of establishing radical reforms in its present status, in order to render it an efficient instrument. We must forthwith proscribe, unconditionally, the collegiate or corporative system—*Board of Health*, and *Superior Government Board*^{*}—and adopt the system of unipersonal authority, since the former if applicable only to the consideration of matters in which a controversy among individuals is to be

^{*} See pp. v, 35, 36, 37, 38, 64, 65, and 82 of this book and that part of Appendix No. 2 which refers to the "Board of Health of Mexico City."

decided, may involve for instance, a point of law, and may consequently require scrupulous deliberation. On the other hand the unipersonal form is the best for the most efficient use of forces and functions demanding energy and quickness of action, and respecting which it may be expedient to exact a determined and well-defined responsibility.

For the rest, efficiency in all manifestations of administrative activity, means economy—in the precise signification and acceptance of the word—involving the moralization of the official ambience, and constituting in this way, one of the most important factors in the moral education of the popular classes.

CHAPTER XIII

COMPULSORY SANITATION

HAVING established *compulsory sanitation in every city having a mortality exceeding the maximum limit of tolerable contamination*, the first question which arises is this: how can we fix this limit of contamination? R. Macé and Ed. Imbeaux—hygienists of world-wide authority—affirm that the coefficient of mortality corresponding to a model city must not exceed seventeen deaths per year for each thousand inhabitants. French legislation causes the value of the maximum tolerable limit to vary, by fixing each time, the average of the coefficients given out by all the urban agglomerations. This is equivalent to imposing on all those cities whose mortality exceeds the total average indicated, the obligation of submitting to compulsory sanitation. In the message which the chief of the executive power of the Republic of Uruguay sent, in December, 1911, to the general congress of Montevideo, submitting a project of law to be executed by the state concerning works of sanitation and the provision of drinking water in the cities and villas of Campafia, the admissible

maximum of contamination was fixed at nineteen deaths per year for each thousand inhabitants. If we accepted for our cities an even higher coefficient, say twenty, and were assured that the sanitary authority, by means of strenuous action, would reduce the urban mortality to the said proportion, then *in the City of Mexico alone there would be saved yearly more than ten thousand deaths, and a much higher number of illnesses would be prevented*—we completely lack statistical data on morbidity—which detract much energy from the national effort, and considerably increase the unproductive consumption. Can a better field be found for the fruitful employment of government energy in behalf of the future development and prosperity of the Nation?

For the proper application of the law of compulsory sanitation we must urge the very great importance of the speedy construction of the works of urbanization required in nearly all the cities of the Republic.

Article 289 of the Cuban Law on the subject states: "Whenever a provincial or municipal authority should neglect to carry on the works or services required by the Secretary of Sanitation and Beneficence, in accordance with the law and the regulations, after the term which the Secretary of the Department may have set, the latter shall have the right to order that the said works be undertaken and carried out charging the same to the corresponding credit, or to that of epidemics,

or to be apportioned between both, but the province or municipality causing the outlay shall be liable for the disbursement. The secretary, representing the State, shall be authorized to claim before the competent tribunal the said reimbursement and when this shall have been realized, the amount will be paid into the National Treasury." Therefore, as soon as the need for the construction of works of urbanization, or for establishing any kind of public sanitation, be ascertained as existing in any one of our cities, in case the municipal authority should fail to satisfy the said need within a reasonable term imposed by the supreme sanitary authority—*Ministry, General Board of Public Health*, or whatever it may be termed—the latter shall be empowered to satisfy the said need, charging it to the account of the local authority mentioned. The resulting invasions into a sphere of action clearly municipal, limited as already stated to the sole exercise of a supplementary function exacted by public health, would most assuredly not lack justification.

Now we come to a great stumbling-block. Where can we get the money to carry on works of such magnitude? This depends upon the earnestness with which we attack the problem of raising ourselves to the level of a civilized community.

It is a simple problem of taxes. The circumstance that various families have settled in a given place, adds to the noxious influences of the surrounding medium upon the human organism,

those derived from physical and moral relations inherent to social life, influences which have been studied in detail in the course of this book, and against which the urban agglomerate must ever defend itself, as an indispensable condition for its subsistence, its growth, and prosperity. The chief means of defense rests in house building to protect the inhabitants, and in the works of urbanization destined to fill the community's needs for sanitation. Now, as construction signifies a productive investment of capital, it is the owners, in consequence, who must subscribe or withstand, through the payment of taxes, the load corresponding to the execution of exterior works of urbanization. *The functions belonging to authority, and which the latter cannot evade without failing to fulfil its great duty of protecting the life and well-being of the governed are: to affix the total amount of taxes to be paid so as to make possible the disbursements required by the construction, conservation, and ulterior enlargement of the urbanization works; to distribute equitably all the taxes among the tax-payers; to collect the same, and to see to the execution of the aforesaid works.*

We must not take in consideration the possibility that the owners might shift the load of the new taxes on to the tenants, raising proportionately the price of the rent, because sooner or later, the house occupants are those who receive the benefits of the sanitary work done, and besides these works naturally increase the value of the property.

Besides the taxes would not be onerous. In the village of Mixcoac, federal district, for instance, no special tax is paid for the service of public sanitation, and there are nearly two thousand lots of improved and unimproved property, within urban limits. If these parcels of property were taxed on the *average* about four pesos per month—naturally the taxation would have to be apportioned equitably—then there would be taken in a sum sufficient to pay interest and accumulate a sinking fund to meet a loan of nearly one million of pesos, a sum with which assuredly, it would be possible to execute the works of paving, sanitation, and provision of drinking water which the town may need.

In short, in order to efficaciously apply the law of compulsory sanitation, and create an inexhaustible fount of benefits for the people, such as the prevention of premature deaths, the prevention of many illnesses, and of suffering untold, on the one hand, and on the other hand the giving of employment to hundreds of thousands, to-day unemployed, in the works to be undertaken in all the cities of the Republic, it is only required that the government have a true consciousness of its duties, and sufficient energy to fulfill them.

CHAPTER XIV

THE INTELLECTUAL, MORAL, AND ECONOMIC IMPROVEMENT OF THE PEOPLE

WHOEVER knows something of our history, and is able to view with impartiality the long and complicated process of the formation of our nationality, extending from the pre-Cortes period, through the troublous time of the Conquest, the colonial days under the viceroys, the wars of independence, the convulsions of nearly one century of autonomous existence, calmed only by the iron hand of Diaz, until our own time, will be bound to discover, in the salient manifestations of the life of the national organism, the unequivocal symptoms and stigmata of a serious pathological state, brought about by two principal agents: *the loathsome corruption of the upper classes and the inconstance and wretchedness of the lower.*

The iniquitous means employed by Don Porfirio Diaz, during more than thirty years, for imposing peace, not only nullified all efforts tending to remedy the evils discussed, but in addition served to intensify them. As a matter of fact, he satisfied the omnivorous appetites of his friends and

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satellites; he crushed and by criminal means caused the disappearance of whoever failed to render tribute or bow to his will; he fostered cowards and sycophants, repressing systematically, with an iron hand, every impulse of manliness and truth. He placed the administration of justice at the unconditional disposal of the rich, paying not the slightest heed to the lamentations of the poor. In a word, he increased the immorality and corruption of the small and privileged ruling class, and increased, in consequence, the sufferings of the immense majority, grovelling in ignorance and hunger. Therefore the thirty or more years of prætorian peace but served to deepen still further the chasm of hatred and rancor separating the two mentioned classes, and to necessarily and fatally provoke the social convulsion, begun in 1910, which has shaken the whole country.

The three aspects of the problem which I have presented—the economic, the intellectual, and the moral—coincide with the purposes of *education* through *the schools*, as ideally dreamed of by thinkers. They have been conceived as "*institutions the object of which is to guide and control the formation of habits in order to realize the highest social good.*"² But our schools, unfortunately, have not yet acquired the necessary strength to counteract to an appreciable degree, the horrible environ-

² William Henry Pyle, Ph.D. Quotation of Ezequiel A. Chávez in his notes on my booklet, *Rudimentary Instruction in the Republic*.

ment of immorality, or to counterbalance its inevitable influence toward social dissolution.

The work and tendencies of the Department of Public Instruction and Fine Arts have in truth oscillated between two extremes. On the one hand, we find the costly, utopian, and beautiful formula of *integral education*, imposed and upheld by D. Justo Sierra in the federal district and the territories for many years, and on the other the grotesque and pauperizing plan of *rudimentary instruction* proposed by D. Jorge Vera Estañol, at the end of the Diaz *régime*, and at the beginning of the Huerta period, with the object of extending its sphere of action over the whole national territory.

The moral failure of the official effort toward *integral education*—though it produced some beautiful examples of kindergartens and elemental and superior schools—was proved by the intense corruption shown by the ruling classes of the capital, in the face of the terrible political happenings of the past years. Its intellectual failure may be proven by the following statistics: *Out of the 720,753 inhabitants of the federal district, the census of 1910 registered only 361,901 individuals who knew how to read and write—that is, scarcely fifty per cent. of the total population.*¹ In this connection it is

¹ For the whole population of the Republic, the proportion of literacy is even more reduced, as *it barely reaches thirty per cent.* (4,394,311 out of a total of 15,139,855 inhabitants).—Census 1910.

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well to note that a goodly portion of the individuals comprised in this figure received their instruction in private schools.

It is easy to ascertain the causes of the failure of our schools to produce results. In the first place, a fitful influence upon the pupils¹ of only a few hours a day, during the so-called school-period, could never of itself realize the work of integral education. As is well known, results can be obtained only from the combined action of the schools and the physical and moral media, the latter being principally formed by the convergence of conditions which prevail in the cosmic, domestic, official, and social ambients. Let us call to mind in this connection our apartment and tenement blocks—dens of all wretchedness and vice—and our public administration, and our society, absolutely permeated with immorality. In the second place, the official educational effort has failed because the department has striven solely to satisfy the minutest theoretical, material, and technical requisites, imitating fine foreign models, and producing some noteworthy establishments as fine as any in the United States or Switzerland; but their cost, in relation to the scant funds available, permitted the establishment only of a number much smaller than that required by the enormous illiterate mass of the metropolitan population.

The system of *rudimentary instruction* served to extend the movement throughout the Republic,

¹ See pages 91-95 and 106-109 of this book.

simplifying the school program and reducing, correspondingly, the cost of foundation and up-keep of the schools. Unfortunately, the simplification was carried too far, and a ridiculously small sum was set aside for the purpose, whereas the sum required would have amounted to many millions of pesos. The Decree on the subject promulgated by the President of the Republic on June 1, 1911, states:

"ART. 1st. The Union's Executive is hereby authorized *to establish throughout the whole Republic schools for rudimentary instruction*, independent of the primary schools already in existence, or which may be founded hereafter.

"ART. 2d. The principal object of the schools of rudimentary instruction will be to teach the natives *to speak, read, and write Spanish; and to impart to them elementary arithmetic.*

"ART. 3d. The rudimentary instruction *will extend over* the space of two years at most.

"ART. 4th. These schools will be established and increased as the funds of the Executive may permit.

"ART. 5th. The Executive is likewise authorized to foster the establishment of rudimentary private schools.

"ART. 6th. The teaching to be imparted in keeping with the recent law, shall not be compulsory: *it shall be imparted to all the illiterate who may apply to the schools, without regard to sex or age.*

"ART. 7th. The Executive will *stimulate at-*

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tendance at the schools, distributing *food and clothing for the pupils*, according to their circumstances.

"ART. 8th. This law does not affect the observance of those laws relating to compulsory education which are extant, or may be enacted in the states, the federal district, or in the territories.

"ART. 9th. To initiate this system of teaching, the Executive will have placed at his disposal the sum of *three hundred thousand pesos*, during the next fiscal year.

"ART. 10th. The Executive will regulate this law within his constitutional rights.

"ART. 11th. At each session period, the Union's Executive will be in duty bound to render a report to the Chamber of Deputies, regarding the application and progress of this law, and also as regards the use made of the fund devoted to the purpose."

I believe I have shown the utter impossibility of applying this law, in the pamphlet entitled *Rudimentary Instruction in the Republic*, which I published in June, 1912, during my tenure of office as Assistant Secretary of Public Instruction and Fine Arts, with the purpose of having an *investigation* made which would satisfactorily solve a problem involving so much responsibility for the government and of so great importance for the country. Here are some extracts from the aforesaid booklet, in regard to the technical defects of the school program under discussion:

"The law prescribes in its third article that *rudimentary instruction extend, at most, over two annual courses.*

"Consider the relative facility of operation of the primary schools of the Federal District, served by a staff specially prepared to teach, with programs, texts, and school matter adequate to the purpose, and all moving under the efficacious vigilance of an active and intelligent technical inspection. Then compare these conditions with the necessarily narrow and difficult situation in which the rudimentary schools would have to work, owing to the restricted means at their disposal, with an organization made up of teachers recruited in the same places where the schools would be established, these places having been selected as being 'the most backward in the country.' These teachers follow methods and texts in keeping with their own lack of instruction and preparation, a circumstance which has already brought forth from well-deserved oblivion, such pedagogic antiquities as the 'San Miguel' Primer. The whole scheme would perforce be abandoned to its fate because of the practical impossibility of establishing an effective inspection. Remember, also, that in the primary schools of the Federal District, despite its almost splendid endowment of technical elements and materials, *the pupils read and write at the end of the second year, only with considerable difficulty.* Then you will realize how absurd it is to expect that the

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utterly illiterate pupils of the rudimentary school, who are mostly Indians who know only their indigenous dialects, *can learn to speak, read, and write Castilian in a space of time no longer than two years*, the time prescribed by law.

"However let us accept for the time being the possibility of the textual application of Article 3d of the law. Fault has been found with the institution of the rudimentary schools because of its scant value as a plan of *integral education*. On the one hand, reading, writing, and the basic operations of arithmetic, though they do not lack, owing to the exercises of mental analysis which their teaching promotes, certain valuable educational importance, are properly speaking only means to acquire other human knowledge, and are not sufficient of themselves, speaking pedagogically, to produce the required *correlation of studies*. On the other hand, the scantiness of the available funds for the teaching staff, schools, furniture, and school supplies, results in a combination of conditions hardly adequate to ensure the harmonious development of all of the child's faculties. Of the two ends attained by this result, instruction and discipline, the second is considered of greater importance, as its object is 'to accustom the pupil to observe, to reason, and to express his ideas; *to moderate and control his passions, to respect the rights of others, and to acquire habits of cleanliness, order, and method*, which are of so great a value later in his life in society.'

Yet this spirit of discipline, as a matter of fact, is precisely the result least favored by the program of rudimentary education. Conclusions based on these considerations and exaggerating perhaps the dangers of not adhering strictly to the modern pedagogic canons, have caused some educators to stigmatize the said schools as being *excellent breeding grounds for 'Zapatistas'* (banditti masquerading as political agitators).

"I do not consider such opinion well founded. It attributes to the school, in an exclusive manner, all educational power over individuals, and it forgets many other factors of as great if not greater influence than the school, such as atavic tendencies, the ambient, the struggle for life, etc. I am sufficiently heretic to believe that, were it possible to make the quantitative analysis of all these influences in the final work of education, probably the school would not have the greatest share of influence. I appeal to all my fellow citizens who know how to speak, read, and write Spanish, and to perform the operations of elementary arithmetic, and who, nevertheless, *are not 'Zapatistas', though they have studied in the primary schools of the country*, which have been, until very recently, such as are advocated by the promoters of rudimentary schools.

"Still the danger pointed out is not chimerical; the foregoing pessimistic conclusion has its basis in fact. This is especially the case owing to the weak educational action of the rudimentary

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schools, so restricted in their field, and because of the *purely abstract character* of the teaching which these schools are designed to impart, which is liable to render them useless or noxious. I refer to the 'most backward regions of the country,' where, owing to their aloofness from all centers of progress and activity, their distance from means of communication, and the special conditions of life of their inhabitants, the *abstract* rudimentary knowledge there diffused cannot have *an immediate practical application*, such knowledge being forgotten with a promptness in direct ratio to the deficiency of the teaching, rendering all schooling quite useless. Moreover, in cases where exactly the preceding does not happen, the uplift produced by the schools of the intellectual level of the people is not accompanied, owing to the schools themselves or to outside causes, by an increase of material well-being. The school work in all cases where the balance between the mental and economical levels of the people was disturbed, would create a permanent condition of discontent, and an admirable field for the pernicious activity of conscienceless and unscrupulous demagogues giving voice to agrarian socialism of the 'Orozquista' and 'Zapatista' brand, advocating the instant and absolute despoliation of all landowners. This would happen even if we substituted the integral for the rudimentary instruction. However much the school influence may improve man, he remains human, and it is natural that his un-

satisfied material needs exert a greater influence on his acts than his will power. To analyze misery is to increase it a hundredfold. To project light into consciences by means of *abstract teachings*, in order to bring out only wretchedness, at the same time leaving in the dark such ways as might lead to economic improvement, is therefore *a most cruel irony for the people, and a menace for our social régime.*

“Considering that the State must preferentially impart elementary teaching to individuals of school age, and only exceptionally to adults, and that the corresponding restriction of attendance at schools increases fourfold the impossibility of applying the law (since the population of school age which at present does not receive instruction is equivalent to the *fourth part* of the total number of illiterates), we find justified the economic convenience of modifying in the sense indicated Articles 6th and 7th of the said law. The latter of these articles might be advantageously suppressed, for until the Union Congress shall authorize in the budget the entry required to realize the principal object of the decree—the complete diffusion of teaching—it becomes ridiculous, or at least useless, aside from the immorality of extending it to adults, to likewise empower the Executive to feed and clothe the pupils.

“I have shown that the program of rudimentary education, in spite of its meagerness could not

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possibly be completed within the period of two years, which the decree fixes as the limit. The inevitable necessity appreciably of increasing this term in order to be able to apply the law with efficiency is apparent. This extension of time can also be made use of by adding to the scantiness of the educational fare, and thereby increasing and guaranteeing the practical utility of the teaching.

"It is not sufficient that the subjects of the program *enable* the pupil, later on, to acquire further useful knowledge for the battles of life. We must give him *the assurance*, or at least assure the *probability*, that the labor started in the school will be extended, by means of the very best modern founts of information: the book and the newspaper. The demand for this information by those who are being educated, is doubtless the only possible guarantee that education will continue after school days. This interest cannot exist if the pupils are incapable of understanding books and newspapers; if they have not been given some knowledge concerning the peoples of the world. They should be taught the situation of the various countries, and the habits of the different peoples; they should know something of foreign institutions, and should have some idea of the natural products, commerce, and industry of other countries. In short, *they should be taught the elements of geography*. Moreover, the characteristic aspect of this subject is that it harbors and welcomes the

general principles of other physical and natural sciences. The study thereof places the pupils in closer contact with nature—our great fount of teaching—and has besides, owing to that great variety of knowledge on meteorology, astronomy, mineralogy, botany, zoölogy, etc., which go to make it up, a remarkable educational value.

“If the law seeks to establish the uniformity of language throughout the commonwealth—a powerful stimulus of patriotism—with the diffusion or propagation of Spanish among the natives, and if the teaching of geography, wiping out the narrow limits of parochialism, renders possible the uplifting of provincialism into a wider and nobler patriotism, then surely some knowledge of *history* would have to be added. Emile Faguet has told us that: ‘The *fatherland* is its history.’ Consequently the study of the nation’s history, while imbuing the pupils with the love and honor of country, brings forth in the citizen a feeling of responsibility towards the commonwealth, and this is of transcendental importance.

“Finally, what would indeed round up the practical side of the program of elemental instruction or education, would be the addition of *drawing*, *singing*, and *manual arts*, for the purpose of bringing out the latent esthetic sense and developing technical efficiency, constituting an admirable preparation for industrial life. The teaching of these subjects should be in perfect harmony with the predominant industrial pro-

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duction, or with the industry most susceptible of flourishing in the locality. The teaching of manual arts has moreover a very important moral influence, because it adds dignity to manual labor, lifting it towards the sphere of the mind.

"Surely three years would be sufficient, that is to say one more than the time appointed by the extant law, to develop the curriculum as here proposed, while retaining of course the elemental character to the whole of the instruction. This is the duration of instruction in Porto Rico's rural schools.

"And to crown the work begun by the elementary schools, directed in a technological sense, let the law authorize the Executive, finally, to establish in each region, and in keeping with its necessities, *one or several practical industrial or agricultural schools*. The principal object of these schools would be to perfect the usual methods of production so as to increase and improve the output, and to enable, through the propagation of the most modern methods and teachings, persons of enterprise and thrift to establish new industries: by-products of the natural output, or of the special aptness of the inhabitants. The value of new methods and influence would be beyond computation in the industry and pursuits of many of our natives, such as the ceramic art and pottery in Guadalajara; the manufacture, as at Olinalá (Guerrero) and Uruápan (Michoacán), of vases and trunks decorated with most original drawings

by means of a certain paint similar to the best Japanese enamel; of the laces and embroideries of Aguascalientes; of the shawls of Santa María (San Luis Potosí) and of Tenancingo (Mexico); of the hats (imitations of Jipijapa or Panama hats) of some parts of Yucatan, for the making of which they carry the palm and fiber from the department of Peten (Guatemala), though it exists in a wild state in the valley of the San Pedro River, an affluent of the Usumacinta, at Tabasco; and of the Mexican hats of western Tabasco; of the Oaxaca mattings and those made by the Chamula Indians of Chiapas. Finally, in a very great number of smaller industries, such as cloth making, pottery, basket weaving, carried on by all the surviving autochthonous tribes, who still use most cumbersome and laborious primitive methods, the production could, by means of school teaching, ingenuity, and adaptability, be so increased that substantial markets in foreign parts could be created, and nevertheless the characteristic native effect be retained. Let us recall in this connection, the weavings of Pamachic, of local fame, for the making of which the Tarahumar women use so primitive an apparatus that—according to Carl Lumholtz—a *scarf* means the work of four days, and a *blanket* the labor of a whole year. Let us consider, moreover, the influence which would be exercised by the popularization in every locality of the most effective and rapid methods of cultivation, by the industrial transformation of

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the products of the soil, to-day not utilized, and by the utilization of numberless founts of production to-day untouched, and we shall reach the conclusion that the people through such means, would not only acquire most valuable and steadying knowledge, but would beget the means of economical improvement which they need so sorely and would bring up to an adequate level the wealth, industry, and welfare of the whole country.

"But if the essential condition for satisfactorily bringing into being social facts derived from the various technical professions, is the efficiency of the staff, this requirement becomes even more imperious when we think of the teaching staff which relies upon a science whose mysteries are just beginning to be known: Psychology. This is all the more important when the curriculum is not too rigidly defined, and necessarily cannot be so, as elasticity and latitude must be allowed for the exercise of good judgment and discernment, according to the race and the environment. A great educator tells us: 'The professor and the pupil must possess the same intimate, inward sense: a mutual affinity, as condition of dual moral and intellectual development. The professor must embody in his personality the characteristic phases and periods of development shown in the pupil, so that the intellectual forces of the child may be enveloped in that atmosphere of sympathy and esteem which is necessary for a wholesome activity. If the teaching is to be efficacious, and

the development natural, there must be in both teacher and pupil certain intuitive elements as a result of the same ethnical phases.' Hence, so that the popular instruction may be truly fruitful, it must be entrusted to a staff proceeding from the same locality as the pupils; and therefore we must proceed, before anything else, and above everything else, to form this great staff by means of the previous establishment of *regional normal schools*.

"In short, it may be said that the proposed modifications to the extant law on elemental education, would consist in: restricting the school attendance permitted by *Article 6th*; in suppressing *Article 7th*, which recommends the free distribution of food and clothing among the pupils so as to stimulate their attendance at school; in extending the term of education so as to comprise three years, instead of the two hitherto allowed as maximum by *Article 3d*; to extend also the program of studies prescribed in *Article 2d*, adding thereto *elemental notions of geography, history, drawing, and the manual arts*; and lastly, in authorizing the creation of *practical agricultural and industrial schools, and also the establishment of regional normal schools*."

In order to be consistent with the contents of this book—without forgetting the clear-cut conclusions arising from almost every page—I shall now have to add to the program of popular

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instruction, *the teaching of the elementary principles of hygiene.*¹

The *investigation* brought about by my pamphlet could hardly have been more fruitful. It brought forth, gratuitously and spontaneously, many new ideas contained in numberless letters, and in seventy odd serious studies and reports confirming in substance those ideas which I have just set forth, and diametrically opposed to official ideas. To better vouch for the matter, I shall transcribe herewith some of the opinions, beginning with the very interesting letter, given in full, written me under date of August 30, 1912, by Mr. Carlos Prieto, a distinguished student, at that time in the last year of the civil engineering course, and later on one of the bravest, most talented, and most honest soldiers of the revolution:

“DEAR MASTER AND FRIEND:

“I have read carefully your interesting pamphlet regarding rudimentary instruction in the Republic. I congratulate you upon the dispassionate *exposé* of the arduous problem, examined always with the earnest desire to get at the truth, and throughout appraising factors at their just value. The matter of itself is apt to lead us to obvious, and most sterile platitudes unless handled with the utmost discernment.

¹ It is proper to call to mind in this connection, that Dr. Everardo Landa, in his collaborating report dated July 25, 1912, called attention to the need of making the said addition to the program of popular instruction.

"You point out, as the three sources of greatest difficulty: the mental level of the people and the nature of the population; the meagerness of funds available; and the law's shortcomings and delay. That is to say, you cite the general condition of the great mass of the people (a passive, even negative element), and the active economical and technical factors.

"The mathematical, or rather dynamic, setting of the question which you place before us is strictly true: the resultant of all available active media should be equal to the sum of resistances which the medium may oppose to the application of the law. Among the resistances which the medium may oppose to such a purpose, there is one very powerful, perhaps the most powerful, resulting from the economic state of our illiterate mass.

"It is evident that the social strata which would be affected by the rudimentary instruction would be in great part the rural population of school age, living in *haciendas* or on estates and ranches, and in the small villages of agricultural regions. This agricultural population of Mexico makes up almost the whole of our national proletariat, and its economic condition is such, that it seems impossible to set down the lines on which to educate them, before attending to the problem of feeding them. Our country laborer's work, besides being miserably paid, is in demand only at certain periods of the year (during sowing and reaping), and

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with such earnings which are obtained only at certain periods of the year he must needs attend to the requirements of his family—frequently a most numerous one. With such a precarious income the feeding problem is of course unsatisfactory; clothing is most primitive; and instruction and morals, which are not indispensable to the problem of sheer existence, are accounted as of no value in a medium where the individual physiological functions of assimilation reach limits of squalor and want.

“Let us assume the operation of the wisest law of primary instruction, favored by the most liberal budgets, carried out by the best technical elements, with the schools distributed among the agricultural population in such a way as to permit easy access on the part of the pupils. The child will attend school, *always* provided that his family can feed and clothe him, without having to use him as a factor in the problem of food and clothing supply. Now in our agricultural regions generally, owing to the rapaciousness and indifference of the owner, and the venality of the political chief, the laborer is kept down in such a condition of poverty that he finds himself compelled to send his son or daughter of school age to work in the fields so as to secure the child's living, and even to have him contribute to the general support. On the estates we see children doing nothing whatever to improve their minds. Little ones from six to twelve years of age take the cattle

and sheep to pasture, frighten away seed hunting birds, and, in a word, carry on whatever tasks are compatible with their physical weakness, and because of the scantiness of the wage they receive the owners prefer them for the work.

"With such conditions, I infer that, were the law not to compulsorily enforce attendance, no one would go to school. However, should the law, notwithstanding the conditions, and regardless of justice, compel the pupils to attend school, then would the government act as a powerful agent to lower further the degraded status of the common people, contributing to their further physiological degeneration.

"You also point out as an interesting factor in the diffusion of instruction 'the emulation brought out by the examples of individual economical improvement caused by instruction' recognizing the enormous importance of the factor 'self-interest.' But in our country at present, such examples are really too rare, to the degree of not producing emulation among our illiterate mass. In our lower strata all are treated alike, save that those less ignorant suffer more, for to their lamentable condition they have to add greater consciousness, and consequently discontent.

"I consider that the economic condition of the rural population is an artificial resultant of the most unsatisfactory distribution of property; of the selfishness of the owner; and of the complicity of the political and judicial authorities (who

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frequently depend on the proprietor and are in his pay). In these conditions it is very difficult to instruct or teach the country laborer, and even should it be done, he is not empowered to struggle against poverty, because the land-owner will continue to pay his miserable upkeep, and the laborer will be still more discontented therewith. 'It is impossible to expect moral education where the economic ambient does not permit it. Those who preach the necessity of educating the masses in order to better their economic conditions state only half truths. The diffusion of instruction benefits in so far only as it makes men discontented with their lot, and prompts them to discard certain vices which sap their vitality and efficiency, and thus enables them to better master their destiny, or to rebel against it.'

"And in this way the public schools become 'breeding grounds for discord and revolution' (Zoydes, *Poverty and Discontent*), and become 'Zapatista factories.'

"As long as the political action of a government does not show tendencies towards improving the economic welfare of the masses of the people, all the methods of intellectual and moral improvement must perforce be utopian. While our proletariat continues in the present economic condition, it will ever be ready to follow the demagogical preachings of any agrarian fallacy or injustice promising relief, and only fear and the instinct of self-preservation will control it. We

must admit that the enforced peace (in Mexico ever since the Conquest we never have had organic peace) has produced gratifying profits to land-owners and merchants, and in a lesser degree to the middle class, professional men, employees, etc., all of whom constitute the great minority of the population. The immense majority has been grovelling in poverty which is really worse than legalized slavery.

"Revolutionary conditions bring, as a rule, contrary consequences. The proletarian who rushes into the fray, in spite of the struggle, enjoys a certain amount of freedom and well-being, since he gratifies his needs and even his caprices, gives way to his revenge, always a sweet pleasure for a primitive brain, becoming almost an esthetic emotion, and enjoys a carnival of spoliation, assassination, and arson. On the other hand, demagogical pratings and exhortations to sacking, have but faint echo among the educated who enjoy a certain amount of physical and moral well-being, as they are reluctant to forsake such benefits as they have, to fly to others that they know not of.

"In the first case, whoever promises is blindly followed. The more he promises the better. To pacific misery, almost elbowing death from inaction, promises of pillage are most alluring, even though they may imply wading through blood and violence. The present condition of the masses could not be worse; they have nothing to lose. 'Zapatism' will continue to exist so long as we

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have land monopoly; and it is idle to seek its origin in illiteracy. Stalking starvation is the cause.

“But if it be resolved to teach the ignorant, without previously improving his miserable economical condition, nor compelling him to go to school, it might be done (I speak of abstract possibilities) by feeding the child at the expense of the government, as is done in some cases in this district. This would increase the expenses of elementary education from \$40,500,000 to \$121,000,000, supposing a minimum expense of ten cents per day for the feeding of each pupil during three hundred days of the year. It is impossible to have such a sum available for elementary education, not only in these days of revolutionary pillage, but even in the quiet days of land spoliation, since the amount of itself exceeds the Republic's whole budget. Even were some such sum available, it would be better to spend it in improving the economic condition of the mass through special channels to be devised, and then to face the problem of decreasing illiteracy. Returning to the mechanical statement of the case, the sum of resistances would have greatly diminished, and consequently the equilibrium sought would be attained with less active elements.

“The solution which you propose approaches to a great degree the educational ideal desired, and might be reached after some years, since to establish it we should first have to form a com-

petent teaching staff, practically capable of teaching children who do not speak Spanish.

"Regarding the assertion that a common speech is one of the most powerful factors for instilling the notion of love of country, I think it must of course be so in some countries of homogeneous population, whose traditions have been handed down from father to son, from the remotest generations, in the common speech, vivid and enfolding. But in Mexico it has undoubtedly a lesser importance, since a great mass of the population is aboriginal, and Spanish is the language of the conquerors. We must not overlook the fact that the Conquest may have brought the Indian the new faith and a questionable civilization, but it also brought him more misfortunes than benefits. The conquered race lost the lands it had freely cultivated, and its sapient agricultural communism.

"From my point of view patriotism has two deep roots, nourished in a more or less homogeneous collectivity, and in the land enjoying such aggregation. For the first we have the factors of race, tradition, customs, language, religion, etc. Patriotism will be all the more intense when with such individual attributes a more homogeneous collectivity is formed. The land owned (directly or indirectly) is the principal factor. Of course there are lands and nations of recent inception where the constituent elements, ethnical, religious, linguistic, etc., form a heterogeneous mass, but

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where there is an equitable direct or indirect apportionment of the land. The natives who are ready to sacrifice their lives in their country's defense and to repel foreign invasion must be impelled by some powerful motive. What is it? For the 'right of dying of starvation'? Of having no land? For tradition? For the mother tongue? For religion?

"In countries such as ours, foreign invasions are repelled as the result of the chivalrous spirit of a few, through 'virility,' through the male's instinct spurred by the officer, which appears after the man has been forcibly impressed into service, the only method of raising an army which has given concrete results. Ever since the Conquest we have been infamously exploiting the common illiterate people. The peon has been made to fight for and against countless revolutions, and never has he had any benefit therefrom, either for himself or his kind. His blood has been shed, to no purpose whatever as regards his material and moral uplift. He has rather receded than advanced. What has the great mass of the common illiterates gained from the wars of Independence, from the Reforma, or from the Maderista upheaval?

"We have allowed to ferment within the race, the righteous land hunger, which has broken out at times for the benefit of others. Now it breaks out in savage manifestations, wherein it does but copy the models of morality within reach. We

must avoid this by doing something tangible to improve the material condition of the proletariat. 'Thus' (says Count de Zoydes) 'in the order of human desires, the necessities come first, and are of wider importance. The desires above the animal scale *may originate* and seek gratification, only when our common desires, common to the animal kingdom, have been satisfied. And those who imagine that the branch of philosophy comprising the gratification of animal desires, and especially the manner of providing man's food, raiment, and habitation, is a rather low and ignoble science, are like a general engrossed in the moving of his forces, and recking not the matter of food supply, clothing, or rest, for his armies . . .'

"I have unwittingly exceeded bounds in examining one of the attributes of the passive factor of the problem of education, but I think I have demonstrated its enormous resistance, so long as the present abject conditions of poverty are allowed to persist. Hence my conviction that the active factors (technical and economic) would not be able of themselves to solve the problem.

"Even with such factors, and that of 'compulsion' to oblige the young illiterate to receive education, it would be a costly immoral act to educate him so as to bring home to him with greater force the hopelessness of his condition. Poverty breeds ignorance, not the reverse. A community which does not suffer from poverty seeks culture spontaneously, from self-interest

and vanity. But only when the animal wants have been provided for can we feel this human vanity, which, however misguided at times, is yet the secret motive power of emulations. Self-love is necessary to urge, and reason to restrain. Such a combination would of course offer the minimum of resistance to the reduction of national illiteracy, following your general scheme. Then it would be possible to bring into play the active factors, since the economic factor, which is so essential, could be obtained by means of indirect equitable contribution, which the community would pay into the state and which the state fails to receive at present, because the great landowner is personally diverting all to his own profit.

"I consider your work most able to demonstrate the great difficulties which surround the problem of extirpating illiteracy, showing how ridiculous is the sum set aside by Congress, striving with so miserable a sop to solve a problem of proportions so transcendental. This crucial question, moreover, had never been before brought to public notice with a view of dealing with it practically. It had been at times felt as the result of romanticism or amateurish sentimentality, used as a shibboleth by superficial souls during ephemeral spells of democratic fanaticism.

"In your modifications to some articles of the law, you present a conscientious project for elementary teaching, extending it to three years, restricting it to the illiterates of school age, and including

indispensable and not abstract matters, in order to positively initiate the evolution of individual faculties, to improve industrial regional activity, and to prepare the way for ulterior mental acquisitions. You do not overlook the industries which remain to us, and by removing their primitive methods, but not the national seal and characteristics, you unfold with admirable perception the practical tendencies of the scheme.

"Such parts of your plan as I fail to specially mention are in thorough accord with the results of my observation. If I have spoken so much of the frightful economic condition of our agricultural mass, it has been simply because, in my opinion, it is the greatest stumbling block to education, and because it is the cause of our great national calamities. If you did not especially dwell on this all-important factor, I fancy it must have been due to your desire to keep within the province of the Department of Education and Fine Arts. Presumably as Assistant Secretary of Education you did not deem it proper to give out an official opinion which, owing to its source, would serve to increase further the well founded discontent of the agricultural population, since the Chief Magistrate does not seem to wish to solve the problem of starvation through its natural channel. He appears to trust to the success of military operations which, if successful, would destroy only the symptom, without modifying the serious distemper of the social organism, due

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to the enormous economic dislocation caused by land monopoly.

"Please overlook whatever is faulty in the style of this letter. I have but wished to utter a plain unvarnished tale, and to contribute my mite to your effort.

"Accept my heartiest congratulations for your earnest endeavors in the cause of general education, and for having resigned your office as Assistant Secretary in view of obstacles of a nature to render your labors less purposeful.

"Your affectionate friend,

"C. PRIETO R."

From Attorney-at-law Rafael del Alba's communication I extract:

"Among current nonsense we find the theory that a nation's advance is measured by the number of people therein knowing how to read and write. It is irrelevant that what is read may be most harmful, and that the writings consist mostly of blasphemy and turpitudes plastered over public places by the *hoi polloi* advertising its knowledge. The lower classes read, that seems to be the desideratum; they read salacious novels, newspapers inciting to crime, and leave on walls and public places scribblings airing their degradation and filthy-mindedness. It seems to have no importance that the said classes are poorly fed, that they never wash, that they fail to work. It will appear odd that some other people not knowing

perhaps how to read or write, listen with interest and discernment to descriptions of journeys, reports on improvement of cultivations, on the works of the region, and that they may dictate to the school teacher or the priest letters in which are revealed honest sentiments and high thoughts.

"An author of works of scientific generalization, who thinks and speaks clearly, says in this regard: 'Regarding primary education the author is not in accord with the significance usually attributed to the figures. It is not possible to measure the culture of a country by the number of individuals who know how to read and write. It is of no importance if you know how to read and write, if you do not read and write, or if what you read lacks all intellectual value. Let us imagine two countries, each one with the same number of inhabitants: in the first one, all know how to read and write, but the books sold at the end of the year amount to five thousand indecent novels and two hundred scientific works; in the second one, half of the population is illiterate, but the other half buys yearly five thousand scientific works and two hundred indecent novels. Doubtless, in these two countries, the one possessing the greatest number of illiterates has nevertheless the highest culture. The number of public libraries in a place is not a sure sign of culture. In most of them are many dead works. We may say the same of a great mass of newspapers and

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periodicals, honey-combed with dry rot. A single scientific review shows the existence of more real culture than fifty magazines devoted to bloody and sensational narrations.' (Emilio del Villar, *The Spanish-American Republics*.)

"It is true that del Villar, following the doctrines of Cordelier, scoffs at the famous coefficients of marriage, legitimacy in births, etc., on which the framers of statistics lay so much stress.

"I remember, in connection with this cult for the sublime science of interpreting printed signs, what Mr. Vigil used to say to me. Mr. Vigil, during the last years of his life, possessed a perfectly clear intelligence; he never showed the faintest kind of decadence, having a most serene judgment, seeing all as though from some eminence; he was cautious of pitfalls and snares, and public shibboleths, knowing that he would soon forsake for ever all things of the earth; in short he was endowed with an Augustan serenity and clearness of vision reminding one of the highest examples of the Greek philosophers. Mr. Vigil, without attributing to the almost diabolical art of reading and that of writing, a very great influence in the daily increasing unhappiness, understood that this misery proceeds perhaps from the fact that all in our sordid life is conventional, and is based on the lies and prejudices which our reason and our conscience reject, but which through habit of cowardice we still revere. He did not believe in the value of merely knowing the signi-

ficance of letters as an element of the progress and culture of a people, nor did he attribute to the numbers of knowers of the alphabet the importance which they are apt to receive . . .”

Lawyer Ezequiel A. Chávez, Assistant Secretary of Public Instruction and Fine Arts, since the creation of this State Department, up to a few months before the fall of General Diaz's government, in his *Notes* makes some noteworthy remarks on my pamphlet, as follows:

“John Dewey, the eminent educationist of the University of Chicago, sums up the central idea as to what *education* really is, considering it as ‘the sum total of processes through which a community or a social group, small or large, transmits its acquired power and purpose, in order to ensure its own existence and development.’ ‘To make clear the need of education,’ he says, ‘all the members already composing society must die, and consequently the conservation of the same society depends upon the education of its new members, so that they may assume the functions of this society, and uphold what it may have of value.’

“Therefore, to prepare the new generations that they may adapt themselves to social life; to place them in possession of the inheritance of progress, organization, and life, which the centuries have been accumulating; to render them capable of utilizing well the said inheritance, of

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preserving it intact, and of increasing and improving it, is the most important question. It is what we must do, if we do not wish to see our organization annihilated by the new members and cause the destruction of the very germs of collective life.

"The most important problem for every people, not only for the Mexican people, consists, therefore, and will always consist, not in establishing *elementary* schools, but in imparting to all the children of that people such an education that through it they may be really placed in possession of the inheritance of culture and advancement bequeathed by predecessors; so that the children in turn may bequeath it to their descendants, improved as far as possible. Only in this way do the people thrive on the roll of nations; and only thus do they constantly progress. There is nothing therefore more important, nor more difficult, nor of greater urgency.

"But if the *elementary* or *rudimentary* schools, such as were prescribed by the law of June 1, 1911, do not place the people in possession of their inheritance of culture, because they do not educate them, nor think of educating them; if they are schools of simple instruction—that is, of mere transmission of subjects, such as speaking, reading, and reckoning, or what Elliott calls the simple tools of education, but not education itself—then we find that the elementary schools are not calculated to transmit to future generations, the power

acquired by the Republic in order to live, nor its purposes; neither can they ensure autonomic existence, and the development of Mexican society.

"It is only too true that nowhere are schools the sole agents of education; but it is also true that they must be the most important agents of education in a society such as ours, where the social medium is poisoned by secular envy and hatred, by the contempt and contumely of generations; a society wherein demagogues can from time to time by fanning rancor and envy among the lower strata cause them to assail the upper classes; where these assume aloofness and a detached contempt and the chasms widen with time; a society where humble homes go to pieces under poverty, vice, the bitterness of misfortune and the general shiftiness of conditions; where left to itself, without educators, it is in peril of falling deeper in the slough of dissolution, and of finally perishing in horrible convulsions, like those monstrous beings, *planaria torva bicephalos* of the laboratory, which when developed artificially, as was done by Dr. Van Duyne, and placed with their heads in opposite directions, exercised such a strain with each head that the animal ended by tearing up its own body.

"The school has, therefore, in societies such as ours, the most difficult mission. It must teach the powerful to understand and love and serve the humble; it must teach the humble to understand, love, and serve the powerful."

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But Mr. Chávez goes farther still. In the pamphlet which brought out the preceding remarks I stated that the teaching given out by the schools in question, because of *its rudimentary and abstract character*, might be *useless or harmful*. Mr. Chávez comes out clearly, and affirms that the said teaching *must necessarily be useless and noxious*: "It will not be noxious for those who live in the small isles of wholesome ambient medium, which fortunately exist in the country; it will not be useless for the few individuals who can practice it; but this will not easily happen, since, as Mr. Pani affirms, it is absurd to imagine that such schools can develop their program in two years, since the majority of the *other schools*, though some of them are excellent in many respects, cannot teach correctly, nor ensure *the ulterior practice of the most useful art of reading, save in a period exceeding two years.*"

And after commenting on other portions of my pamphlet, Mr. Chávez concludes:

" . . . For the good of the Republic it must be hoped that, as soon as possible, the law establishing *rudimentary schools* be adequately amended."

From a conscientious study made by Architect Federico Mariscal—commissioned to do so by the Athenæum of Mexico—I extract the following significant passage:

"For further proof, we could cite what happened

in Italy. In Calabria, schools of the *rudimentary* type were established, of the very kind which you so wisely condemn, and, as a consequence, after a certain time, there was a great increase in criminality."

This work would have no end if I tried to include therein all the opinions against the wild plan of rudimentary schools, which were made a part of our institutions by decree of June 1, 1911, and which can only be explained away by the haste with which the tottering government of Don Porfirio was compelled to throw sand in the eyes of the people, pretending to have, in its agonizing efforts at self-preservation, the same aspirations as had been proclaimed by the revolution which overthrew it after a few days.

But what is more difficult to understand is why the following chiefs of education, Messrs. Pino Suárez, and Díaz Lombardo, should have fathered the project with great concern. They almost consumed the allotments assigned by Congress, in organizing the Ministerial Section which had to direct and manage the corresponding service—which did not exist,—in journeys of the so-called installators of the schools throughout the wildest and most remote regions of the country, and in school furniture. However, only a few schools were finally organized and operated, and under most scanty and inadequate conditions.

And, what is even more astonishing—since by

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that time the adverse opinions were many and weighty—as soon as Lawyer Vera Estañol returned to the Department of Public Education, through the overthrow of the legal government, Congress was required to authorize the increase of the number of rudimentary schools to five thousand, with an allotment of four and one half millions of pesos per year. “By establishing many schools,” says the *Law-Project*, “in the greatest possible number of places where ignorance has hitherto been densest, and organizing them with programs of elementary studies, *just sufficient to awaken by the light of the alphabet and numbers* the millions of souls who sleep in the darkness of rankest ignorance,” the Minister felt certain that he could guarantee the future redemption of the nation, “preparing the children for their subsequent duties in a nation such as ours which has such marked democratic aspirations, and placing the adults in condition to cast their votes at the ballots with the required conditions of understanding and altruism.”

Many were the cynics—of whom our corrupt environment breeds an abundant crop—who ascribed this absurd pertinacity to the political interest of controlling the votes of the new teachers at the next presidential elections. I will stoop to no further comments.

A few more words before closing.

The mere expression of ideas generated by the

study of the conditions of the life of our people was a sort of materialization which carried them, through their own weight and almost without effort, to a condensation in the various partial conclusions which I have pointed out in each of the chapters which make up this vast exposition. In the same way, if we glance through such an exposition of facts, of ideas, and of conclusions—though they may not be conserved in the memory—it will not be possible to resist the natural impulse, of almost unconscious reflection, of grouping it all, and of concentrating it in one channel, so as to decide, before closing this book, that:

The true problem of Mexico consists, therefore, in hygienizing the population, physically and morally, and in endeavoring, by all available means, to improve the precarious economical situation of our proletariat.

It must be fully realized that the solution of the part of this problem which concerns the Department of Education and the municipalities lies in *establishing and maintaining the greatest possible number of schools*; to do which their cost must be reduced by means of *a rational simplification of the organization and of the school curriculum*. This must be done *without reaching the pedagogic poverty of rudimentary instruction, and without losing sight of the fact that the essential requirements are: technological teaching to co-operate, with all the other organs of the government, in the work*

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of economic improvement of the masses, and, *diffusion of the elemental principles of hygiene*, as an efficient protection for the race.

And, finally, as the medium constitutes an educational factor more powerful than the schools themselves, *the country must, before and above all, organize its public administration upon a basis of absolute morality.*

Appendices

NO. I

THE CONSTITUTIONALIST GOVERNMENT CONFRONTED WITH THE SANITARY AND EDUCATIONAL PROBLEMS OF MEXICO

Address Delivered by Alberto J. Pani, C.E., to the Members of the American Academy of Political and Social Science and of the Pennsylvania Arbitration and Peace Society, in "Witherspoon Hall," Philadelphia, Penn., U. S. A., on Friday Evening, November 10, 1916.

MR. CHAIRMAN,

MEMBERS OF THE ACADEMY AND OF THE PENNSYLVANIA ARBITRATION AND PEACE SOCIETY,

LADIES AND GENTLEMEN:

During the most acute and violent period of an armed revolution—a veritable chaos in which it would seem that the people, after destroying everything, try to commit suicide in a body—the news of isolated cases, however horrible they may be, cease to cause a deep impression, before the awfulness of the general catastrophe. As the struggle reaches some form of organization by the grouping of men around

the various nuclei representing the antagonistic principles in action, individuals grow in importance until the nucleus which best interpreted the ambitions and wants of the people acquires absolute ascendancy. Then this group is unreasonably expected to strictly fulfill all the obligations usually incumbent upon a government duly constituted. The sensations then provoked by the news of isolated cases of misfortunes suffered by individuals, because of their very rarity, cause greater consternation.

This is precisely what is occurring with the present Mexican Government. Take any two dates from the beginning of its organization. Compare dispassionately the relative conditions of national life, and it will be necessary to admit that the country is rapidly returning to normal political and social conditions. It is also undeniable that the temporary interruption of a line of communication, or the attack on a train or village by rebels or outlaws, now causes an exaggerated impression, people forgetting that, not so long ago, the greater part of the railway lines, or the cities of the Republic, were in the hands of said rebels or outlaws, and that in the very territory dominated by the Constitutionalist Government trains and towns were but too frequently assaulted.

But it is inconceivable to try to make the present Government responsible for the transgressions of its predecessors. The revolution itself is a natural consequence of these faults. Former governments who knew not how to prevent the revolution are responsible for the evils which it may have brought in its train, and should the nation be saved, as it shall be, it will be due solely to the citizens who have been willing to sacrifice themselves. In truth it is only

through personal sacrifices that it is possible to construct a true fatherland.

The enemies of the new *régime*—irreconcilable because they will not accept the sacrifices imposed—are now burning their last cartridges, making the Constitutionalist Government responsible for many of the calamities which caused the revolution, and which the Government, impelled by the generous impulse which generated it, purposes to remedy. Thus do we explain the protests of the discontented, and the monstrosity that said protests are even more energetic and loud when they defend money than when they defend life itself.

The theme of this night's address refers to one of these calamities, a shameful legacy of the past. Inimical interests are trying to attack the Constitutionalist Government on this score, though it is the first Government in Mexico which has tried to remedy this evil. Having been appointed by the First Chief in charge of the executive power of Mexico, Mr. Carranza, to make the study of the problem, I would only have to summarize or copy, in order to develop such theme, some fragments of the corresponding report.

“One of the most imperative obligations that civilization imposes upon the State is to duly protect human life, to permit the growth of society. It becomes necessary to make known the precepts of private hygiene and to put them in practice, and to enforce the precepts of public hygiene. For the first, there is the school as an excellent organ of propaganda. For the second, with more direct bearing on healthfulness, there are principally special establishments to

heal, to disinfect, to take prophylactic measures. Then there are engineering works, laws and regulations put in force by a technical personnel, or by an administrative or police corps. *It may therefore be said, without exaggeration, that there is a necessary relation of direct proportion between the sum of civilization acquired by a country, and the degree of perfection attained by its sanitary organization."*

The activities, in this respect, of General Diaz's Government, during the thirty-odd years of enforced peace and of apparent material well-being, were devoted almost exclusively to works to gratify the love of ostentation or speculation. Seldom were they devoted to the true needs of the country. There were erected magnificent buildings. To build the National Theater and Capitol, both unfinished, it was planned to spend sixty millions of pesos. When it was a case of executing works of public utility, their construction was made subservient to the illicit ends pointed out. Thus, for example, the works of city improvement, never finished, not even in the Capitol, in spite of the conditions of notorious unhealthfulness of some important towns, were always begun with elegant and costly asphalt pavements, which it became necessary to destroy and replace, whenever a water or drainage pipe had to be laid. The work of education undertaken by the Government was chiefly dedicated to erecting costly buildings for schools; it is only in this way, therefore, that we can realize that the proportion of persons knowing how to read and write is barely 30% of the total population in the Republic.

The net result of what was done in these respects during the long administration of General Diaz

could not be more disastrous. If we take the average of mortality for the nine years from 1904 to 1912, the heyday of that administration, we find that in Mexico City, where the greatest sum of culture and material progress is to be found, there is *a rate of mortality of 42.3 deaths for each one thousand inhabitants*. That is to say:

I.—*It is nearly three times that prevailing in American cities of similar density (16.1);*

II.—*Nearly two and one half times larger than the average coefficient of mortality of comparable European cities (17.53); and*

III.—*Greater than the coefficient of mortality of the Asiatic and African cities of Madras and Cairo (39.51 and 40.15 respectively), in spite of the fact that in the former cholera morbus is endemic.*

The annual average, corresponding to the same period, of deaths in the City of Mexico due to avoidable disease, if proper care for private and public hygiene be taken—an arraignment against the administration of General Diaz—reaches more than 11,500 deaths. Now as the deaths occasioned by the Revolution during the six years surely do not reach 70,000, then we find that the Government of General Diaz—so greatly eulogized—in the midst of peace and prosperity did not kill fewer people than a formidable revolution which set afire the whole Republic, and horrified the whole world.

But the truth is that General Diaz's Government did not recognize the formula of *integral progress*—the only one which truly ennobles humanity—and wasted its energies in showy manifestations of *a progress purely material and fictitious*, with the inevitable train of vice and corruption. The ostentatious

pageant—the most shameless lie with which it has ever been attempted to deceive the world—which celebrated the anniversary of National Independence took place exactly a few weeks prior to the popular Revolution of 1910, before whose onrush the Government fell like a house of cards.

Let us now turn to the Constitutionalist Government. In its banner it has written the resolve to better the condition of life of the people, socially and individually, and its sincerity and energy may be seen not only in the words but in deeds.

The Constitutionalist Government, during its sojourn at Vera Cruz at the close of 1914 and the beginning and middle of 1915, while the army reconquered the territory of the Republic, at first almost wholly in the hands of the enemy, in spite of being engaged in the most active campaign in the annals of Mexican history, still found time to take up the efficient political and administrative reorganization of the country.

“Whoever may know something of our history, and may view with impartiality the long and complicated process of formation of our nationality, from the pre-Cortes period, through the troublous time of the Conquest, colonial days under the viceroys, the wars of Independence, the convulsions only calmed by the iron hand of Diaz, of nearly one century of autonomous existence, until our own time, will be bound to discover, in the salient manifestations of the life of the national organism, the unequivocal symptoms and stigmata of a serious pathological state, brought about by two principal agents: *The loathsome corruption of*

the upper classes, and the inconstance and wretchedness of the lower. . . .

"The iniquitous means used by Don Porfirio Diaz to impose peace, during more than thirty years, not only annulled all efforts tending to remedy the evils discussed, but rather determined their greater intensity. As a matter of fact, it satisfied the omnivorous appetites of his friends and satellites; it crushed and caused the criminal disappearance of whoever failed to render tribute or bow to his will; it fostered cowards and sycophants, repressing systematically and with an iron hand every impulse of manliness and truth. It placed the administration of justice at the unconditional disposal of the rich, paying not the slightest heed to the lamentations of the poor. In a word it increased the immorality and corruption of the small and privileged ruling class and increased in consequence the sufferings of the immense majority, groveling in ignorance and hunger. Therefore, the thirty or more years of prætorian peace but served to deepen still further the secular chasm of hatred and rancor separating the two classes mentioned, and to provoke necessarily and fatally the social convulsion, begun in 1910, and which has shaken the whole country."

The three aspects of the problem which I have presented—the economic, intellectual, and moral—coincide with the purposes of *education* through *schools*, as ideally dreamed of by thinkers, that is as "*institutions whose object is to guide and control the formation of habits to realize the highest social good.*" But our schools, unfortunately, have not yet acquired the necessary strength to assuage, in an appreciable degree, the horrible ambient immorality, or to counterweigh its inevitable effects of social dissolution.

"The true problem of Mexico consists therefore in hygienizing the population physically and morally, and to endeavor to find, through all means available, an improvement in the precarious economical situation of our proletariat. . . .

"The part of the solution of the problem which corresponds to the Department of Education or to the municipalities must be realized, establishing and maintaining the greatest possible number of schools, to do which, their cost must be reduced by means of a rational simplification of organization and of school programs. This must be done without losing sight of the fact that its preferential orientations should be marked by: the character—essentially technological—of the teaching, to coöperate with all the other organs of the Government in the work of economical improvement of the masses, and, through the diffusion of the elemental principles of hygiene, as an efficient protection for the race.

"And as, finally, the medium does constitute an educational factor more powerful than the schools themselves, the country must, before and above all, organize its public administration upon a basis of absolute morality."

To come to a conclusion, restricting myself to the purpose of this address, it will suffice to say that, when the Constitutionalist Government ruled but an insignificant portion of the country, there were yet sent to the principal centers of culture of the United States several hundred teachers to investigate and secure data to reform school matters in Mexico. This was done at a time when dollars were of great importance for the purchase of war material.

Subsequently, in spite of the countless obstacles which seemed to obstruct every step of the Government, the number of schools has been greatly increased. It is now much greater than it was before the Revolution: in some states it has been doubled. There have been effected, besides, important works of city improvement in Mexico, Saltillo, Querétaro, Vera Cruz, etc., and the mouth of Panuco River is about to be dredged. It has been specified in the respective contract that the soil taken out is to be used to fill in the marshy zone around Tampico, thus eliminating the chief cause of this city's unhealthfulness.

In short, in order that the Government which has arisen from the Constitutionalist Revolution may realize its program of public betterment, which implies the physical and moral hygienizing of Mexico, it is only necessary to give it time. Only some magic art could transform in a moment a group of human beings into an angel choir, or a piece of land into a Paradise.

NO. II

BIBLIOGRAPHY PERTAINING TO MORTALITY

Charts Nos. 1, 2, and 3

BOARD OF HEALTH OF MEXICO

THIS office furnished me with the coefficient of mortality of the City of Mexico to be found in Charts 1 and 2 (42.3), obtained from the deaths in the city registered by the same Board for the year 1911 (19,956 deaths), and from the population assigned to all the municipality by the census of 1910 (471,066 inhabitants).

I believe there exists an error in the calculation made by the Board of Health. The reports of the work done by this Board in 1911 give for the whole municipality of Mexico—as is set down in synoptical table of page 37—a mortality of 21,680 deaths; the relative coefficient, the population being 471,066 inhabitants, is consequently 46.02. Now as the population of the municipality decreases rapidly from the center to the periphery, that is to say from the city properly so called to the ranches and sparsely populated regions surrounding the center, and as the law of proportion between mortality and density is fully confirmed in the said synopsis table, *it is not conceivable that the coefficient of mortality for the City*

of Mexico is 42.3, or that it is inferior to the death rate for the whole municipality, which is 46.02.

I do not know how the Board of Health overcame the difficulty of restricting with precision the perimeter of the city; but if it did so with the death rate it must also have done so with the figure for the population: it would then have secured a much higher coefficient. Still, in tables 1 and 2, I adopted the figures furnished by the Board for the reasons which I will here set forth. The data which serve to obtain the coefficient of mortality—annual number of deaths and population—have not the same degree of approximation, because of the different manner in which they are obtained. The register of deaths, through the number of burials and incinerations or cremations, is practically exact, whereas the census operations, so difficult in countries so backward as ours, always give results which understate. The correction which owing to this should be made to the coefficient—inversely proportional to the population—would consequently be contrary to that incurred by the Board of Health; though both errors should not compensate each other, leaving the coefficient of mortality less than the true, but probably larger than that furnished by the Board; the value given by the latter served for the purposes of the tables mentioned, and the considerations which precede serve to strengthen the conclusions deducted therefrom.

The coefficients of mortality for the City of Mexico—to be seen in table No. 3—for 1895 to 1912, were figured taking the death rates for each of these years—furnished by the same Board—and of those referring to population, according to the three sole census

operations made in all that time: in 1895, in 1900, and in 1910. It seemed to me rational, instead of calculating the coefficients solely with the three aforesaid data of population, to secure the probable figures relative to the fifteen remaining years, supposing that the variations of said population should restrict themselves to a certain continuity, according to arithmetical progression, in the spaces of time included between the three only years when data were taken.

PUBLIC HEALTH REPORTS

Of this Bulletin published in Washington, U. S. A.,—in accordance with Act of Congress of February 15, 1893—by the *Public Health and Marine Hospital Service*, I took all the data of weekly deaths therein contained, referring to sixteen of the cities included in tables 1 and 2, data which I give in the table annexed herewith.

As in the said Bulletin there were missing the figures pertaining to very few weeks, I furnished these figures for each city, with the averages of all those corresponding to the other weeks of 1911. Thus the coefficient of mortality for Montreal was secured thus:

The total of deaths in fifty weeks—all that was furnished by Bulletin—is 8804; the average of weekly deaths in that time is consequently $\frac{8804}{50} = 176$. Considering this as the average weekly deaths—which could not be far wrong, since only the data referring to two weeks have been omitted—then the total annual mortality is $176 \times 52 = 9152$ and the probable coefficient—the city in question having 450,000 inhabitants—is $\frac{9152}{450} = 20.36$.

BULLETIN ANNUAL DE STATISTIQUE DÉMOGRAPHIQUE MÉDICALE

Out of this publication, issued by *La Division d'Hygiène de la Ville de Bruxelles*, we have secured the data for 1911 for the following thirty European cities:

Germany: Berlin, Breslau, Cologne, Dresden, Frankfurt-on-the-Main, Leipzig, and Munich.

Austria-Hungary: Vienna, Budapest, and Praga.

Belgium: Brussels.

Bulgaria: Sofia.

Denmark: Copenhagen.

Spain: Madrid.

France: Paris, Lyon, Marseilles.

Holland: The Hague, Amsterdam, and Rotterdam.

England: London, Dublin, Leeds, and Sheffield.

Italy: Rome.

Norway: Christiania.

Russia: Saint-Petersburg and Odessa.

Sweden: Stockholm.

Switzerland: Berne.

Other Founts of Information

The data relative to the other cities included in tables Nos. 1 and 2, proceed from the various authorities herewith:

Central America

San José (Costa Rica). Pages 85 and 93 from *Statistical Summaries* published by the National Bureau of Statistics for 1883 to 1910, at San José,

Costa Rica, 1912. Volume furnished by the Costa Rica Consul in Mexico.

Guatemala (Guatemala). The figures on population were taken from page 998 of the *Almanach de Gotha*, 1913, whereas those referring to mortality—including all the Department of Guatemala—are found in page 24 of the first *Bulletin of Agriculture and Statistics* corresponding to July, 1912, published by the Department of the Interior of Guatemala. There is a copy of this volume in the Library of the Department of the Interior (*Fomento*) of Mexico.

Tegucigalpa (Honduras). The figures for population are to be found at page 1003 of the *Almanach de Gotha*, 1913. The mortality was given by the Honduras Consul at Mexico.

Managua (Nicaragua). The figures for population are to be found at page 1064 of the *Almanach de Gotha*, 1913. The mortality proceeds from the *Bulletin of Statistics of the Republic of Nicaragua*, Nos. 14 and 15, corresponding to January 1, 1911, and published March 1st of the same year. Volumes furnished by the Nicaragua Consul at Mexico.

San Salvador (El Salvador). The data of population as well as of mortality are to be found at page 7 of the corresponding number of the quarter from January to March, 1911, of the *Bulletin of Statistics and Meteorology* of the General Bureau of Statistics of the Republic of Salvador. Volume furnished by the Salvador Consul at Mexico.

South America

Argentine (Buenos Ayres). Data taken from page 1265 of volume ix. of the *Universal Illustrated Euro-*

pean and American Encyclopedia, to be found in the National Library of Mexico.

Rio Janeiro (Brazil). Data taken from the *Monthly Bulletin of Démographo-Sanitarian Statistics of the City of Rio Janeiro*, numbers corresponding to 1911, to be found in the Library of the Board of Health of Mexico City.

Santiago (Chili). Data furnished by His Excellency the Minister of Chili at Mexico. Calculating the coefficient of that city, using the figures of population and mortality—404,481 inhabitants and 14,457 deaths respectively—which are to be found on pages 21, 44, and 45 of the *Synopsis of Statistics and Geography of the Republic of Chili in 1907*, published in 1909 by the Central Office of Statistics of Santiago of Chili, the said coefficient turns out to be only 35.7—that is, less than that consigned in table No. 2, by nearly five deaths per year for each one thousand inhabitants. The work in question is to be found at the National Library of Mexico.

Bogotá (Colombia). Data furnished by the Colombian Consul at Mexico.

Panama (Panama). The population figures proceed from page 1078 of the *Almanach de Gotha*, 1913. Those for mortality are to be found on pages 20 and 21 of No. 22 of the *Bulletin of Statistics of the Republic of Panama*, published by the General Bureau of Statistics of Panama. Volume to be found in the Library of the Department of Fomento at Mexico.

Montevideo (Uruguay). The figures for population are to be found on page 1240 of the *Almanach de Gotha*, 1913. Those for mortality from page 7 from *Civil Conditions and Mortality in the Oriental Republic of Uruguay* in 1911, report published in 1912 by the

General Bureau of the Civil State. Volume to be found in the Library of the Mexican Society of Geography and Statistics.

Caracas (Venezuela). Data taken from page 868, No. 11, May, 1911, of the *Bulletin of the Minister of the Interior* (Fomento) of Venezuela; publication to be found in the Library of the Department of Fomento at Mexico.

West Indies

Havana (Cuba). The figures for population are to be found on page 808 of the *Almanach de Gotha*, 1913. Those of mortality are to be found on page 613 of volume vii.—corresponding to June, 1912—of *Sanitation and Benefaction*, a monthly publication of the same Department.

Europe

Bucharest (Rumania). Data taken from the table of Demographic International Coefficients, consigned in volume viii., 1910, of the *Annual Summary of Municipal Statistics of Montevideo*, 1911. Volume to be found in the Library of the Uruguay Consulate.

NO. III

**TABLE SHOWING THE MORTALITY OF THE CITY OF
MEXICO AND ITS CAUSES FROM 1904 TO 1912**

**TABLE SHOWING THE MORTALITY IN THE CITY OF MEXICO, AND ITS DIFFERENT CAUSES DURING THE CYCLE
1904 TO 1912**

CAUSES OF MORTALITY	1904	1905	1906	1907	1908	1909	1910	1911	1912	Mortality in 9 years	Average Annual Mortality
I. General Diseases:											
Typhus.....	248	383	1230	485	743	583	708	933	375	5,778	642.0
Typhoid fever.....	30	27	34	27	29	35	43	40	27	292	32.4
Yellow fever.....		1								1	0.1
Intermittent fever and cachexia:											
palustris.....	48	53	57	27	25	21	28	31	31	321	35.7
Pox.....	102	157	549	353	405	544	90	390	429	3,109	345.4
Scarlet fever.....	33	8	20	16	379	453	55	34	120	1,118	124.2
Erysipelas.....	63	124	112	93	74	121	136	144	142	1,000	112.1
Measles.....	99	134	25	203	88	148	250	124	160	1,231	136.8
Diphtheria and croup.....	52	70	67	82	167	129	39	50	61	717	79.7
Grippe.....	102	221	81	101	119	59	71	77	76	907	100.8
Whooping cough.....	132	158	121	85	143	109	102	160	184	1,203	133.7
Scarbotic distemper.....		1	3	1	1	5	4	1		16	1.8
Cholera nostrum.....	14	25	10	10	25	26	25	14	16	165	18.3
Purulent infection and septicæmia.....	25	61	31	40	65	53	58	80	82	495	55.0
Beri-beri.....									1	1	0.1
Rabies.....	1	4	2	4		4	2		1	24	2.7
Dysentery.....	44	63	49	32	47	54	42	58	49	438	48.7
Tetanus.....							2	10	3	15	1.7
Lung tuberculosis.....	125	1159	1169	1107	1275	1210	1148	1195	1089	10,337	1170.8
Meninges.....	73	57	79	59	48	37	32	40	28	453	50.3
Larynx.....	26	20	21	33	32	21				162	18.0
General.....	94	100	77	79	54	54	60	48	40	606	67.3
Scrofula.....	0	5	3	6	0	14				46	5.1
Syphilis.....	113	120	160	128	142	164	162	175	172	1,336	148.4
Abdominal tuberculosis.....	272	248	239	196	225	223	192	202	185	1,982	220.2
Acute.....										8	0.9
Organic.....	5	11	11	11	22	26	22	24	26	158	17.6
Cancer of the mouth.....	15	4	8	12	16	11	13	5	2	86	9.6

Cancer of the stomach and liver...	52	67	54	57	40	49	31	31	48	439	47.7
Cancer of the peritoneum, intestines, rectum, etc.	16	16	15	15	14	7	20	13	22	138	15.3
Cancer of the breast.	14	4	13	10	8	3	7	9	17	97	1.8
Cancer of female genital organs...	106	113	99	96	93	81	88	91	105	872	96.9
Cancer of the skin.	20	22	7	10	7	1	10	4	8	89	9.9
Cancer of other organs...	24	26	53	43	74	69	60	55	53	477	53.0
Other tumors (except tumors of woman's genital organs).....	4	2	8	2	3	12	8	5	7	51	5.7
White tumors.	8	6	8	8	10	2	5	9	7	63	7.0
Malignant pustule.	18	3	—	—	—	—	—	1	—	3	0.2
Addison's disease.	11	1	4	—	4	3	10	6	8	37	4.1
Pott's disease.	11	4	15	5	1	9	10	7	8	72	8.0
Leucemia.	4	7	2	1	1	4	3	2	3	27	3.0
Anemia and chlorosis.	20	13	12	14	8	11	14	14	22	186	14.2
Acute articular rheumatism.	4	20	34	23	25	27	34	20	25	212	23.6
Chronic and gouty rheumatism.	—	—	11	13	13	9	12	3	3	64	7.1
Leprosy.	2	6	5	8	8	13	5	5	6	53	5.9
Diabetes.	9	14	10	12	31	15	9	16	26	148	16.4
Rachitism.	—	—	—	—	—	—	11	15	8	34	3.8
Cold abscess, and congestional.	—	1	—	—	1	1	—	—	—	3	0.3
Other epidermal illnesses.	—	—	2	—	5	3	3	3	1	23	2.6
Pelagra.	—	—	—	—	—	1	—	—	—	1	0.1
Bacius exophthalmic.	—	2	1	—	—	1	—	1	3	7	0.8
Professional auto-intoxication.	—	—	—	1	—	—	—	—	—	1	0.1
Acute or chronic alcoholism.	194	315	311	463	531	467	339	372	517	3,599	389.9
Scurvy.	—	—	2	—	—	—	—	—	—	2	0.2
Other chronic poisonings.	1	—	1	—	1	—	—	2	—	5	0.6
Other general illnesses.	2	—	9	1	4	5	4	1	—	26	2.9
Children gonococcus distempers.	—	—	—	1	—	1	—	—	—	1	0.1
Actinomycosis, trachiosis, etc.	—	—	—	1	—	—	—	1	—	2	0.2
11. Illnesses of the Nervous System and of the Sensory Organs:											
Encephalitis.	21	20	14	17	16	6	14	12	12	132	14.7
Simple Meningitis.	485	482	450	541	659	593	517	593	551	4,880	342.2
Cerebro-spinal Meningitis.	22	30	20	—	20	20	13	30	60	215	23.9
Locomotor ataxia progressive.	19	7	9	5	5	8	3	6	13	77	8.6
Other illnesses of the spinal medulla.	41	39	42	40	43	30	31	31	23	326	36.1

CAUSES OF MORTALITY	1904	1905	1906	1907	1908	1909	1910	1911	1912	Mortality in 9 years	Average Annual Mortality
Cerebral congestion and hemorrhage	365	372	368	347	496	428	450	466	568	3,790	421.1
Softening of the brain.....	19	14	19	19	10	11	32	13	13	136	17.3
General paralysis.....	22	8	23	22	22	22	20	10	13	164	18.2
Paralysis of unknown cause.....	1	1	5	3	3	5	8	7	8	41	4.6
Other forms of mental disease.....	13	30	32	30	29	34	29	—	7	194	21.6
Epilepsy.....	29	50	48	65	71	67	48	29	48	455	50.6
Children convulsions.....	182	199	171	167	145	147	119	115	120	1,305	151.7
Tetanus.....	9	12	11	4	3	4	—	—	—	53	5.9
Non-puerperal eclampsia.....	—	—	9	—	3	7	4	2	10	35	3.9
Coræa.....	—	—	—	—	2	5	1	2	1	11	1.2
Other illnesses of the nervous system	37	42	25	36	62	35	49	33	43	362	40.2
Ear diseases.....	5	5	3	4	4	5	3	3	3	35	3.9
Eye diseases and derivations.....	2	—	1	—	—	1	1	—	—	5	0.6
III. Diseases of the Circulation:											
Pericarditis.....	18	21	22	32	23	24	17	16	22	195	21.7
Acute endocarditis.....	27	37	31	24	32	55	48	43	50	347	38.6
Organic diseases of the heart.....	610	681	642	726	761	839	780	771	810	6,620	735.6
Angina pectoris.....	17	8	16	12	20	13	14	24	19	143	15.9
Atheroma, aneurism, etc.....	95	120	94	82	94	99	90	88	109	880	97.8
Emboliah and thrombosis.....	11	26	12	13	21	27	24	29	26	189	21.0
Varicose hemorrhoids, phlebitis, etc.	8	6	5	1	5	7	3	6	2	43	4.8
Lymphangitis, etc.....	1	1	—	2	8	8	2	5	6	33	3.7
Hemorrhages.....	22	38	52	46	66	50	43	60	54	431	52.3
Other affections of the circulatory apparatus.....	24	14	12	9	2	1	—	—	—	62	6.9
IV. Illnesses of the Respiratory Organs:											
Nasal cavities.....	—	—	2	1	2	1	2	1	—	9	1.0
Larynx.....	65	86	88	74	76	72	52	50	62	625	69.4
Acute bronchitis.....	1002	1146	922	1062	1188	1174	1230	1205	1113	10,042	1115.8
Chronic bronchitis.....	25	35	21	15	30	23	18	18	26	211	23.4
Bronchial-pneumonia.....	704	873	692	924	1119	1023	952	1024	990	8,301	922.3
Pneumonia.....	1229	1434	1400	1494	1568	1728	1594	1592	1710	13,769	1529.9

Pleurisy.....	74	74	71	72	80	95	98	68	78	710	78.9
Congestion and pulmonary apoplexy.....	149	176	212	242	230	181	209	203	276	1,938	215.3
Pulmonary gangrene.....	22	13	5	6	6	8	3	3	2	68	7.6
Asthma.....	1	1	9	9	4	6	9	5	2	39	4.3
Pulmonary emphysema.....	122	155	102	104	94	98	95	89	80	939	104.3
Other illnesses of the breathing organs.....	217	380	406	566	338	101	94	59	70	2,233	248.1
V. Illnesses of the Digestive Apparatus:											
Mouth affections and derivations.....	10	18	8	11	6	8	5	5	4	75	8.3
Angina and pharynx affections.....	6	5	15	4	36	33	9	7	10	131	14.6
Esophagus affections.....	—	1	—	—	4	2	3	4	2	16	1.9
Stomachic ulcers.....	21	20	32	20	16	20	20	25	29	203	22.6
Other stomachic complaints.....	32	59	43	78	33	50	100	52	69	516	57.3
Diarrhea and enteritis (less than 2 years).....	2266	2303	1925	2223	1937	2130	2394	2221	2292	19,711	2180.1
Chronic diarrhea.....	29	233	462	521	631	510	—	—	—	2,436	270.7
Chronic diarrhea and enteritis (2 years and more).....	1654	1989	1566	1924	2160	1957	2779	2427	2717	19,173	2130.3
Intestinal parasites.....	6	1	3	1	2	2	4	3	2	24	2.7
Hernia and intestinal obstructions.....	94	133	114	97	117	110	83	82	82	912	10.1
Other intestinal affections.....	13	36	86	139	201	353	343	303	333	1,847	209.2
Grave icterus.....	21	23	20	19	48	54	32	41	38	286	31.8
Cirrhosis of the liver.....	631	904	933	846	909	786	592	603	702	6,966	797.3
Alcoholic cirrhosis of the liver.....	—	—	—	—	—	—	—	—	—	30	3.3
Bile calculi.....	4	3	6	3	4	1	16	2	5	44	4.9
Other liver complaints.....	1320	446	337	391	435	390	282	—	266	2,867	318.6
Simple peritonitis (except puerperal).....	79	102	98	104	115	125	117	145	124	1,009	112.1
Bladder diseases.....	1	—	—	—	—	—	1	—	—	2	0.2
Other illnesses of the digestive apparatus.....	257	348	268	122	46	6	5	—	—	1,052	116.9
Appendicitis and phlebitis.....	17	17	20	13	20	16	18	26	14	161	17.9
Spleen complaints.....	—	—	1	—	—	1	—	1	—	1	0.1
Liver tumors.....	—	—	—	—	—	—	—	—	—	2	0.2
Liver complaints not classified.....	—	—	—	—	—	—	—	256	—	250	28.4
Diseases of the rectum and stercoral fistulas.....	—	—	—	—	2	—	2	—	1	5	0.5

CAUSES OF MORTALITY	1904	1905	1906	1907	1908	1909	1910	1911	1912	Mortality in 9 years	Average Annual Mortality
<i>VI. Diseases of the Genito-Urinary Apparatus and Derivates</i>											
Acute nephritis.....	65	74	51	70	110	148	84	85	58	754	81.8
Bright's disease.....	101	145	144	190	166	175	219	251	245	1,090	88.4
Other kidney complaints.....		0	7	4	13	9	7	10	5	61	6.8
Bladder calculi.....	2	5	3	—	3	4	5	—	2	24	2.7
" complaints.....	9	14	11	11	11	6	19	13	10	104	11.6
Other urethra diseases.....	19	18	19	16	22	31	24	25	29	203	22.6
Illnesses of the prostate gland.....	9	6	4	6	5	6	5	2	7	53	5.9
Metritis.....	1	—	3	3	5	5	4	1	6	28	3.1
Non-venereal disease of the male.....	—	—	—	—	3	—	—	—	—	3	0.3
Uterus hemorrhage non-puerperal..	4	1	9	2	4	4	7	11	8	50	5.6
" tumor non-cancerous.....	0	3	7	16	4	1	4	6	7	57	6.3
Other ovary tumors.....	4	8	4	3	6	7	5	2	2	41	4.6
" uterus illnesses.....	—	—	2	8	3	2	—	2	—	17	1.9
" illnesses of the female genital organs.....	5	2	10	7	11	8	6	2	—	51	5.7
Non-puerperal illnesses of the mam-milla.....	—	—	—	—	—	—	—	—	—	2	0.2
Salpingitis.....	—	1	—	—	—	—	1	—	8	8	0.9
<i>VII. Puerperal State:</i>											
Puerperal hemorrhage.....	34	29	22	11	9	7	8	7	12	139	15.4
Puerperal accidents.....	1	1	—	1	4	3	2	1	2	15	1.7
Pregnancy accidents.....	59	85	93	92	75	104	87	65	84	744	82.7
Puerperal septicemia.....	—	—	—	—	—	—	—	—	—	1	0.1
Puerperal metrorrhionitis.....	—	—	—	—	—	—	—	—	—	140	15.0
Other childbirth accidents.....	8	5	4	18	24	20	14	18	29	82	9.1
Albuminuria and puerperal eclampsia	10	9	8	9	6	8	11	7	14	77	8.6
Puerperal alba-dolens phlegmatia...	1	—	—	—	—	2	2	—	—	7	0.8
Other puerperal accidents.....	1	3	—	3	3	3	2	—	—	13	1.4
Puerperia without further explana-tion.....	—	—	—	—	—	—	—	—	1	1	0.1

VIII. Illnesses of the Skin and of the Cellular Tissues:

Gangrene.....	70	72	57	82	88	105	96	76	74	720	80.0
Flegmon hot abscess.....	43	67	55	56	70	71	56	44	36	498	55.3
Carbuncle, anthrax or divinus.....	7	—	—	1	8	4	2	3	6	31	3.4
Other skin diseases.....	2	4	16	6	15	13	12	3	1	70	7.8

IX. Bone Diseases and of the Organs

<i>Diseases of Locomotion:</i>											
Diseases of the articulations, except- ing tuberculosis and rheumatism.....	2	2	3	9	6	8	8	5	3	46	5.1
Other diseases of the organs of locomotion.....	14	—	—	—	—	—	1	—	—	15	1.7
Amputation.....	—	—	—	1	—	1	—	—	—	2	0.2
Affections of the bones, except phthisis.....	14	13	13	23	19	26	9	5	2	124	14.9

X. Malformation:
Defects of congenital formation, not
including still-births.....

18	30	33	24	28	26	26	14	17	22	212	23.6
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XI. First Infancy:
Congenital debility and scleroma.....
Lack of care.....
Other special diseases of infants.....

473	590	562	586	619	668	691	698	800	5,687	631.9
111	129	81	93	86	21	32	36	28	4	8.4
									617	68.6

XII. Old Age:
Senile debility.....

60	56	80	99	103	127	139	121	127	912	101.3
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XIII. Affections Produced by Exterior Causes:

Suicide through jumping from high places.....	—	—	—	—	—	—	—	—	—	3	0.3
Suicide due to hanging.....	—	—	2	2	3	1	1	1	3	13	1.4
" " " firearms.....	—	—	—	—	—	5	4	3	7	19	2.1
" " " poisoning.....	—	—	—	—	—	8	5	1	5	20	2.2
" " " asphyxiation.....	—	—	—	2	—	—	—	—	—	8	0.2
" " " stabbing.....	—	—	—	3	8	—	1	—	—	1	0.1
Other suicides.....	7	6	—	—	—	—	—	—	—	25	2.8

CAUSES OF MORTALITY	1904	1905	1906	1907	1908	1909	1910	1911	1912	Mortality in 9 years	Average Annual Mortality
Fractures.....	74	83	74	90	108	100	122	130	119	889	98.8
Accidental traumatism.....	311	400	407	487	464	452	370	391	87	3,369	374.3
Traumatism through cutting instru- ments.....	—	—	—	—	—	—	—	—	163	163	18.0
Traumatism through fall.....	—	—	—	—	—	—	—	—	2	2	0.2
" due to machines.....	—	—	—	—	—	—	—	—	1	1	0.1
" due to pounding and crushing.....	—	—	—	—	—	—	—	—	170	170	18.9
Accidental asphyxia.....	—	—	—	18	35	30	—	—	—	83	9.3
Asphyxia due to unknown causes.....	—	49	5	—	—	—	—	—	—	54	6.0
Burnings.....	24	24	26	42	21	51	44	44	41	317	35.2
Electrical commotion.....	6	12	6	—	3	4	3	1	4	39	4.3
Accidental submersion.....	53	8	38	26	33	22	40	40	36	296	32.9
Inanition.....	19	25	24	33	36	11	4	5	—	157	17.4
Absorption of deleterious gases.....	3	10	17	5	4	2	21	19	25	106	11.8
Acute poisonings.....	1	3	4	3	5	14	17	18	17	88	9.1
Other external violence.....	—	1	—	1	6	4	83	121	125	341	37.9
Luxations.....	—	—	—	—	—	2	1	2	—	4	0.4
Excessive cold.....	—	—	—	—	—	—	—	—	—	1	0.1
Hunger.....	—	—	—	—	—	—	—	—	3	3	0.3
XIV. Uncertain Diseases, or Ill- Defined:											
Dropsy.....	4	1	2	1	3	15	—	—	—	26	2.9
Sudden death.....	4	4	—	6	27	40	40	40	49	210	23.3
Ill-defined organic lesion.....	—	—	—	—	—	—	9	14	6	29	3.2
Non-specified, or ill-defined illnesses	445	591	540	420	406	296	135	109	131	3,082	342.4

SUMMARY

CAUSES OF MORTALITY	1904	1905	1906	1907	1908	1909	1910	1911	1912	Mortality in 9 years	Average Annual Mortality
I. General Diseases.....	3,222	3,871	4,842	4,064	5,079	4,897	4,050	4,536	4,200	38,761	4306.8
II. Diseases of the Nervous System and of the Sensory Organs.....	1,272	1,312	1,259	1,302	1,529	1,428	1,344	1,352	1,495	12,293	1305.9
III. Diseases of the Organs of Cir- culation.....	833	952	886	957	1,032	1,123	1,030	1,042	1,008	8,953	994.8
IV. Diseases of the Organs of Re- spiration.....	3,610	4,393	3,930	4,564	4,815	4,510	4,356	4,377	4,409	38,064	4320.3
V. Diseases of the Digestive Organs.....	5,461	6,661	5,937	6,536	6,792	6,554	6,806	6,203	6,716	57,666	6497.3
VI. Diseases of the Genito-Urinary Organs.....	288	283	274	336	375	406	390	410	387	3,149	349.8
VII. Puerperal State.....	114	132	127	134	123	147	124	99	142	1,142	126.9
VIII. Diseases of the Skin and of the Cellular Tissues.....	122	143	128	145	181	193	166	126	117	1,321	146.8
IX. Diseases of the Organs of Loco- motion and of the Bones.....	30	15	16	33	25	35	18	10	5	187	20.8
X. Malformation.....	18	30	33	24	28	26	14	17	22	212	23.6
XI. First Infancy.....	584	719	643	679	705	691	724	734	829	6,308	700.9
XII. Senile Debility.....	60	56	80	99	103	127	139	121	127	912	101.3
XIII. Affections Produced through External Causes.....	408	620	609	713	726	706	716	766	816	6,170	685.6
XIV. Ill-Defined Diseases.....	453	596	558	427	436	351	184	163	186	3,354	372.7
TOTALS.....	16,565	19,783	19,322	20,013	21,949	21,194	20,061	19,956	20,549	179,392	19,932.4

NO. IV

ECONOMIC CONDITIONS OF SOME FAMILIES AMONG WORKING PEOPLE

FIRST EXAMPLE

AGUSTIN LÓPEZ:

Works as a peon in the city's public gardens and parks; receives \$0.75 per day, during all the days of the week, and supports his mother and wife.

WEEKLY BUDGET OF THE FAMILY

EXPENSES

Feeding:

8 <i>cuartillos</i> of corn	\$1.04	
2 <i>cuartillos</i> of beans	0.48	
2 kilos of meat.....	0.70	
Peppers.....	0.16	
Salt	0.11	
Sugar.....	0.11	
Wood and coal.....	0.60	
Pulque.....	0.42	
	<hr/>	\$3.62

Clothing:

2 meters of manta or percal.....	0.62
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Washing:

Soap	0.25
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House rent:

Pays weekly for a narrow and damp room, 5th Chile Street No. 19, Colonia Santa Julia	0.50
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Hairdressing:

Has his hair cut every three weeks at a cost of \$0.20; the weekly expense amounts there-fore to.....	\$0.07
Total.....	\$5.06

RECEIPTS

Receives weekly at the rate of \$0.75 daily.....	5.25
Weekly surplus.....	\$0.19

Dwelling

Resides at the 5th Street of Chile No. 19, Colonia Santa Julia. The habitation consists of one room, rather damp, though within there is a range fire burning during the greater part of the day. The dwelling is made of adobe with brick floor, and has 3.40 meters length, by 3.37 meters width, and 4.00 height. There is no furniture save two mats whereon the family sleeps. There are plenty of cooking utensils, and they are kept very clean. The whole habitation is clean also. The tenement is well provided with water from an artesian well, and it has washing places for the community of tenants.

SECOND EXAMPLE

MARCELINO NIEVES:

Works as a peon in the city's public gardens; receives \$0.68 per day, during all the week, and he supports his wife and two children.

THE FAMILY'S WEEKLY BUDGET

EXPENSES

Food:

36 kilos of dough to make <i>tortillas</i> or maize baked cakes.....	\$1.80
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Wood for cooking.....	\$ 1.00	
1 <i>cuartillo</i> of beans.....	0.20	
1 kilo of meat.....	0.18	
1 kilo of salt.....	0.25	
Peppers.....	0.10	
Sugar.....	0.03	
		<hr/>
		\$3.56
<i>Clothing for all the family:</i>		
2 meters of manta or percal.....		0.40
<i>Washing:</i>		
Soap.....		0.12
<i>House rent:</i>		
Corresponding payment.....		0.50
<i>Hairdressing:</i>		
Cuts his hair every three weeks at a cost of \$0.25; the weekly expense is therefore.....		0.08
		<hr/>
Total.....		\$4.66

INCOME

Receives weekly at the rate of \$0.68 daily.....	4.08
	<hr/>
Weekly deficit.....	\$0.58

Dwelling

Their dwelling could hardly be worse. It is situated in a nameless street of the Santa Julia Colony, near some swampy lands. It is made up of an enclosure formed by one adobe wall, and three walls of old and badly joined boards, through the openings of which drafts find access easy. The roof is of zinc sheets, in very bad condition. The enclosure measures 6.70 meters in length by 4.39 meters in width and 3.20 meters in height, with only one door, low, and narrow. It serves as shelter for all the family, and the sole furniture consists of two mats to sleep, a comal or *tortilla* cooking utensil, and a few cooking utensils; everything is filthy and presents the aspect

of direful poverty. The air is close to the point of oppressiveness, owing to the smoke from the wood burned within the hut.

A partly civilized being could barely remain two consecutive hours in such an awful hovel, the unhealthfulness of which is greatly increased by the emanations from the swamps referred to above.

The water used for washing and other purposes is taken from a well close to the house, and the open field is the only place used for urinating and defecating by the inhabitants of this den, and of the similar ones around.

It is truly surprising that the wretched family of this workman should have survived a two years' sojourn in such conditions.

THIRD EXAMPLE

FÉLIX LUNA:

Works as peon in the city's public gardens; receives \$0.75 per day, during every day of the week and supports three grandchildren.

WEEKLY BUDGET OF THE FAMILY

EXPENSES

Food:

9 <i>cuarterones</i> ¹ of maize for <i>tortillas</i>	\$1.26
Coal.....	0.50
1 ½ <i>cuartillos</i> of beans	0.30
Meat (only on Sundays)	0.15
Peppers.....	0.12
Salt	0.18
Milk (for one child)	0.42
Sugar.....	0.12
Pulque.....	0.42
	<hr/>
	\$3.47

¹ Mexican dry measure equivalent to 1.72 quarts.

Clothing for all the family:

Manta or percal, 3 meters	\$0.60
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Washing:

Soap and lye	0.20
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House rent:

Corresponding payment.....	1.00
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Hairdressing:

Has his hair cut once a month at a cost of \$0.10; the weekly expense is consequently.....	0.03
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Total.....	\$5.30
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INCOME

Receives per week, at the rate of \$0.75 daily....	\$5.25
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Weekly deficit.....	\$0.05
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Dwelling

It is situated at No. 1914 Escandón Street at Tacubaya. It is an apartment made up of one piece with yard and kitchen, all with much light, and in relatively good hygienic conditions. The room is 4.20 meters long by 3.07 wide and 3.75 high, with painted walls and wooden floor. The only furniture is a large mat on which the whole family sleeps. There is besides a makeshift to store clothes made up of two cases, and a wooden shelf. The walls are ornamented with religious chromoes, calendars, and other prints and trifles.

The cleanliness to be observed in the room and yard are noteworthy, and most uncommon.

The apartment is plentifully provided with water and there is a sink providing facilities for clothes washing for the community at the distance of some meters. Although the whole tenement is occupied by families in most humble circumstances, it does present a very clean aspect.

FOURTH EXAMPLE

ISABEL FLORES AND CATARINO FLORES:¹

They work as peons in the city's public gardens; they receive \$0.75 per day, respectively, for every day of the week, and support the wife of one of them and two children.

THE FAMILY'S WEEKLY BUDGET

EXPENSES	
<i>Food:</i>	
20 <i>cuartillos</i> of maize	\$2.40
4 <i>cuartillos</i> of beans	0.80
Wood	1.40
Meat	1.60
Salt: 1 kilo	0.50
Peppers	0.65
Sugar	0.34
	<hr/>
	\$7.69
<i>Purchase of clothing:</i>	
Average	1.50
<i>Washing of clothes:</i>	
Soap	0.30
<i>House rent:</i>	
The dwelling wherein they live has been gratuitously ceded to them as remuneration for personal services	
<i>Hairdressing:</i>	
They have their hair cut every 15 days at an expense of	0.15
	<hr/>
Total	\$9.64

RECEIPTS

They earn per week, at the rate of \$1.50 per day ..	\$10.50
	<hr/>
This leaves a weekly surplus in their favor of	\$0.86

¹ They are considered jointly as they belong to one and the same family, and they both contribute to the support of the same with the produce of their work.

Dwelling

They live in a wooden house, that is fairly well built, to be found in a lot which is adjacent to the lateral gardens of the Reforma. The same is 5 meters long, by 3.50 wide, and 5 high. It receives the sunlight during the whole day, and this helps to keep the interior quite dry. As an annex to the houselet, there is a small kitchen also made of wood where the food is cooked without having to use the dwelling for the purpose. In the dwelling there sleep at night, on four mats, eight persons, or that is, four who make up the family of Flores, and four members of another family who live with them and whose living expenses have not been included in this report.

The furniture of the dwelling is made up of a small table, four cases to keep clothes therein, a stand, and two small shelves. The kitchen is supplied with various utensils, and of course the *metate* with which to make *tortillas*. Cleanliness in the home is to be observed, and the people living therein seem to be persons of good habits.

The water for washing and for other domestic purposes, is obtainable in the gardens nearby.

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